THE ENGINEERING AND MINING JOURNAL.

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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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PREMATURE DEGREES.

ONE of the most important suggestions made during the joint discussion on Technical Education, held by the Society of Civil Engineers and the Institute of Mining Engineers at Philadelphia in June, was that which several speakers advanced and no one openly opposed, concerning the granting of degrees by our technical schools to their graduates. The sentiment of the meeting was so decided upon this matter that a motion was made to instruct the joint committee of the two societies to take such steps as might seem advisable in the direction of a reform of the existing system. The motion named as the evil to be removed the practice of granting the degree of Civil or Mining Engineer at the time of graduation. It would undoubtedly have passed by a large majority, and perhaps by a unanimous vote, but for the decision of the Chairman that it was out of order, since the joint committee could not receive instructions from a meeting of that character enlarging or changing the functions for which, and for which alone, it had been created by the two societies. Undoubtedly the chair was correct in this decision, though, upon reflection, we think it would have been perfectly legitimate to allow the motion to pass, modified so as to express merely the sentiment of that meeting ; and we wish such a course had been taken. But its omission is a matter of small import. The main thing is, that the attention of engineers and of the managers of schools of engineering should be called to the great and growing evil which is here in question.

The whole subject of degrees in this country is beset with difficulties. Degrees in theology have long ceased to mean anything ; and many of our best colleges now refuse to make Doctors of Divinity at all. The degrees of LL.D., D.C.L., and Ph. D., are conferred among us as honors, and seldom or never in the United States as the result of certain courses of study and examination. When we come to the degrees more frequently given by our colleges, such as A.B. or A.M., and the professional degrees of M.D., C.E., and M.E., we find a host of institutions endowed by a host of legislatures, on a host of various conditions, with the right to confer such titles. Prof. CLARKE's recent article in the *Popular Science Monthly* sets forth with merited satire the inadequate means provided at many of these institutions for the work of instruction. Yet no doubt, under some circumstances and in some special lines, the graduate of a small and obscure country college may honor his degree more than the average graduate of a crowded and famous one. The precise trouble is, that, which ever may be the more worthily bestowed, there is no guaranty that the degrees mean in two cases the same thing, but a heavy probability to the contrary.

The proposition has been made, that the wearers of these titles should append also the designation of the institution granting them—a thing which, being undesirable to a large proportion of them, would prove, we fear, impracticable ; and which, if it were practicable, would still be inconvenient, and, after all, inadequate. The public could apply no test of merit ; and the larger colleges would carry off the credit, by reason of their size and popularity, while much excellent work, performed at smaller institutions, might remain unrecognized.

Another remedy might be found in the suggestion of ROBERT LOWE that the true ideal of a University is a body of examiners only, set to examine the candidates trained by others than themselves, and having the exclusive power to confer degrees. In this country, there might be one University board (like, though unlike, our New York Board of Regents) in each State. Every college, having no power to grant high degrees, but only giving certificates of some sort, would send up its candidates to pass the examinations. Many young men would, perhaps, be satisfied with the college course, and would not try for the degree. Some candidates might come from no college at all, but on showing a certain minimum period of study performed in private, and on passing the required examination, would receive the same degree as others who had arrived at fitness by the usual organized methods.

The particular recommendation of this scheme would be the swift and certain test of comparison among colleges and schools which it would secure. The weakest institutions, if their graduates stood this test more successfully on the whole than others, would come quickly to fame. But the ordeal should be a severe one, at least for the higher degrees. It should be no positive disgrace to fail under it, but a great victory to succeed. The severe examinations of the London University, to which, it is said, young men come in great numbers from all parts of Great Britain, simply because the degree from that university is worth more than any other, furnish an illustration of what might possibly be hoped for from a system under which an independent and severe Board of Examiners should sit in judgment on the work of colleges.

The present plan of allowing the professor who has taught the student to examine and "pass" him, is a farce, and nothing more. Not that professors as a rule violate their consciences in the matter; but the examination itself is a farce, because either the student acquits himself just as they knew he would, or else he has better or worse luck in the examination than he deserves; and in either case the professor's judgment could be as well expressed before as after the examination. It would be very well to require of a college student some certificate of study and graduation as a prerequisite to the University examination. But the latter should be a critical test of his proficiency, conducted by persons of the highest competency, and entirely independent of the institutions which would gain credit from his success.

It is suggested that the Bachelor's degree might safely remain to be given by the colleges, as a sort of certificate, such as we have referred to. We have no objection to that. A. B. and B. S. have little more than that meaning now. They show that the student has passed through the regular course in Arts or in Science, whatever that course may be, at some college or school possessed of a charter from the Legislature. A certificate would show the same thing and give the name of the institution besides.

So much for the general subject. We do not hope much from the remedies suggested, but look rather to see the degrees in Arts and Laws go on declining in significance until they become as worthless as the degree in Divinity. It is the natural result of making them cheap and common. But we do hope that something may be saved for the technical and scientific degrees. It is not too late to demand of all technical schools that they shall give upon graduation no title higher than the baccalaureate, and that the master's titles (for such should be their assimilated rank) Ph. D., C. E., M. E. (or E. M., as our Frenchified friends of the Columbia School have it), shall be given to Bachelors of Philosophy or Science only and upon certain conditions of continued study and independent or responsible work. The exact conditions to be fixed for the two degrees which concern us most are matter for discussion by the Society of Civil Engineers and the Institute of Mining Engineers respectively. We trust they will take hold of the question, each society in its own way, or jointly, as may seem best to them. A strong denunciation of the present system, which makes a full nominal engineer out of a young man who has scarcely "declared his intentions" and "taken out his papers ;" a bold demand addressed to the schools by these two great societies, could not easily be disregarded. We understand that the subject will pretty certainly come up at the October meeting of the Institute. Will the Civil Engineers reinforce us mightily, if we take the initiative ? *

NEW PUBLICATIONS.

THE FATIGUE OF METALS UNDER REPEATED STRAINS. From the German of Prof. LUDWIG SPANGENBURG, with a Preface by S. H. SHREVE, A. M. New York : D. VAN NOSTRAND, 1876. pp. 89. 50c.

THIS little work contains a summary of Prof. SPANGENBURG's experiments, which were undertaken with a view to check the results obtained by A. WÖHLER in his extended series of investigations. WÖHLER was able to claim the denomination of the following principles :

"Rupture of material may be caused by repeated vibrations, none of which attain the absolute breaking limit. "The difference of the limiting strains are sufficient to account for the rupture of the material."

He also gave values for the safe strains that could be employed with different materials, and it was for the purpose of verifying these values that Prof. SPANGENBURG continued the experiments with the same form of apparatus as was used by WÖHLER. So far as his experiments have gone, he considers that WÖHLER's results are only confirmed in the case of spring steel, and are very probable for other materials. A summary of these results may be of interest. Below are given the limiting strains, in pounds per square inch, as stated by WÖHLER. It will be understood that when the load changes from + to — it indicates the reversal of the strain, and that in the case of strains between two positive values, a portion of the load is permanent. It is further to be noted that the values given should be corrected in practice by the application of a factor of safety, one-half being recommended by WÖHLER, and one-third by Prof. SPANGENBERG.

PERMISSIBLE TENSILE STRAIN FOR IRON.	PERMISSIBLE STRAIN FOR AXLE STEEL.
Between + 17,000 and — 17,000	Between + 29,000 and — 29,000
" + 31,000 " 0	" + 50,000 " 0
" + 42,000 " + 25,000	" + 83,000 " + 36,000

PERMISSIBLE STRAIN FOR UNHARDENED SPRING STEEL.

Between	52,000 and	0
"	73,000 "	26,000
"	83,000 "	42,000
"	94,000 "	62,000

"Pieces which are subjected to alternate pull and thrust, as piston rods, etc., must be about 9 to 5 stronger than those bearing but one kind of stress." Using a factor of ½, WÖHLER gave the following values of the permissible strain :

Iron strained in both directions	8,300
" " " one direction	18,700

Not more than 16,000 lb. per square inch being due to the variable stress.

Unhardened cast steel, strained in both directions	12,500
" " " " one direction	34,300

Not more than 23,000 lb. being due to the variable stress.

In the above extracts, the values, which are given by the translator in centners per square inch (German), have been reduced to English standards. The translator would have added considerably to the value of this little work, if he had made the reductions throughout. Any one, however, can do it for himself, in a very short time.

Following the account of the experiments is a discussion of the molecular constitution of metals, the effect of strain, and the reasons for the various results obtained. The engineer will find this of considerable interest and value, some of the old theories on the resistance of materials being summarily treated. Indeed, it must be evident, that if WÖHLER'S theories and conclusions are correct, most of the former rules and experiments require revision. This little work should be read by all who are interested in the matter. R. H. B.

ARCHITECTURAL IRON WORKERS' MANUAL. By W. J. FRYER, Jr. JOHN WILEY & SONS, New York. $3.50.

This book will prove useful to architects and engineers in making estimates for iron work, for it embodies tables of the weight, strength, and cost, of nearly every piece of iron in use in ordinary architectural work. The specification and contract forms will also prove useful. As an *aide memoire* it will be found of great value, and we know of no other book that furnishes so fully the practical information.

BOOKS RECEIVED.

The receipt of all new publications will be acknowledged under this head in the next issue of the Journal. Many of these books will be subsequently critically reviewed.

MINES AND MINERAL STATISTICS OF NEW SOUTH WALES. Government publication.

LABOR IN EUROPE AND AMERICA. Dr. EDWARD YOUNG, Chief the U. S. Bureau of Statistics. Published by S. A. GEORGE & Co., Philadelphia. Price $2.

THE WAGES QUESTION. By Prof. F. A. WALKER. HENRY HOLT & Co., New York.

RAINFALL AND EVAPORATION. Edited by JAMES FOREST, Sec., Institution of Civil Engineers, London.

REULEAUX' KINEMATICS OF MACHINERY. London and New York : MACMILLAN & Co. $7.50.

THE AMERICAN IRON TRADE. JAS. M. SWANK.

CONVERSAZIONE OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

Special Report of the Engineering and Mining Journal.

BORAX LAKE AND SULPHUR AND QUICKSILVER DEPOSITS OF CALIFORNIA.

AT the regular Thursday evening meeting at the rooms of the Centennial Committee of the American Institute of Mining Engineers on August 3d, Mr. W. S. KEYES, of Nevada, who is one of the Judges in the department of mining and metallurgy at the Exhibition, gave quite an interesting account of the Borax Lake and mineral deposits near Clear Lake, in California, which he had recently visited.

Clear Lake lies about 65 miles north-west of Susian Bay, the latter being one of the branches of San Francisco Bay. The lake, which is about 25 miles long, has a north-west and south-east direction, corresponding with the trend of the adjacent mountain ranges. Its outline is quite irregular, being long and narrow at its lower end, while near the middle an arm about four miles long projects toward the east. The upper end of the lake widens out and forms an irregular area of about 30 square miles. The country surrounding this end of the lake is formed of high hills which are composed of rocks supposed to belong to the Cretaceous Period. On the south-west and south-east side of the lake the rocks are of volcanic origin, being in most part composed of compact lava with small amounts of pumice and disintegrated scorias. Thermal springs are found in these rocks which give evidence of the more active influence which once were exercised there. The great geysers which lie about 15 miles to the south-west, are probably in the same belt of volcanic rocks. In 1856, Dr. J. A. VEATCH discovered that the water of a small lake about 4,000 feet long and 1,800 feet wide, which lies in the neck of land included between the southern end and the eastern arm of Clear Lake, contained a considerable amount of borax. The amount of solid matter contained in a gallon of water was found, by analysis, to be 2,401 grains, of which 281 grains were dry borax. Investigations, which were soon made by means of cofferdams sunk in the bed of the lake, disclosed the fact that there was a layer of blue mud about 18 inches thick containing crystals of borax, which bed covered the lake bottom. The deposition of the crystals was irregular, some portions of the mud deposit not containing any. In 1864 a company was formed to extract the borax from this mud, and so successful were they in their operations that in a short time they stopped all importations of the article from abroad and brought its price down from about 25 to 10 cents a pound. An operation similar to the killing of the goose which laid the golden eggs was undertaken by the company, which put a stop to their operations. With the hope of striking springs which supplied the lake with concentrated borax water they put down a bore hole which, unfortunately for them, struck a strong vein of pure water and soon increased the body of the lake to such an extent as to prevent them from working the borax any longer.

SULPHUR AND QUICKSILVER DEPOSITS.

Mr. KEYES then spoke of a mineral deposit which, with regard to its composition and method of occurrence, was not paralleled, so far as he knew, anywhere else in the world. This is a deposit of what was thought to be native sulphur, and which was first discovered at the extremity of the bay on the east side of Clear Lake. This deposit, which has since been traced towards the east for over 3,000 feet, lies along on both sides of a fissure through which, in several places, thermal springs containing bicarbonate of ammonia, free carbonic acid, chloride of sodium, bicarbonate of soda, and free silicic acid have been discovered.

Explorations which have been made to a width of 1,000 feet across this fissure, have shown that there is a top deposit from two to three feet thick, which is composed of disintegrated lava mixed with a small amount of sulphur and cinnabar, yielding from ½ to 1½ per cent. of mercury. Under this decomposed lava there is a bed of impure sulphur, from six to eight feet thick. The amount of sulphur in this layer varies from 30 to 80 per cent., the sulphur sometimes being in nearly pure lumps of considerable size. The gangue material mixed with the sulphur, is lava similar to that found in the bed above. Lying beneath this sulphur deposit is a bed of lava, which has been found to contain from 1½ to 2½ per cent. mercury in the form of cinnabar, and also a little sulphur. This bed has been investigated to a depth of 75 feet without discovering its bottom, and is found to cover nearly the whole area along and across the fissure of 3,000 by 1,000 feet. The first effort which was made to work any of these deposits consisted in an attempt to refine the sulphur found in the sulphur bank, by distilling it in the ordinary manner in retorts. Repeated efforts to do this were unsuccessful, owing to the necks of the retorts becoming stopped up by something, the nature of which was not then recognized. This afterwards proved to be a small amount of cinnabar which was mixed with the sulphur. The attempt to work the bed was soon given up, and no operations were carried on again at the deposit until 1874, when the Sulphur Bank Mining Company commenced working both for the sulphur and the mercury.

NEW PROCESS OF SULPHUR EXTRACTION.

The process employed for extracting the sulphur is a novel and exceedingly simple one. The apparatus used consists of an inverted **T** retort made of cast iron, and having an oval section. Doors which can be luted, are made at the top and front ends of the retort. Inside of it a perforated plate of sheet lead is placed on the bottom, underneath which are openings through which steam can be admitted. The bottom is set so as to slope toward one end, and at the lowest point there is a discharge pipe for drawing off the semi-refined sulphur. The method of operating the retort is as follows : Lumps of the impure sulphur are piled up on the lead bottom before described, this being done from the end doors. After the lower portion is filled in in this way the vertical portion or shaft has the finer parts of the impure sulphur thrown into it. The doors are then luted on, and steam, at a pressure of 31 pounds to the square inch, is admitted through the holes in the bottom of the retort. This soon permeates the mass of the sulphur material and at the pressure of 31 pounds its temperature is just that required to render the sulphur liquid. The sulphur, when melted, runs down through the perforated plate, which prevents the passage of the gangue material, and collects in the bottom of the retort. When sufficient has collected it is drawn off through the discharge pipe. The valve used to close this pipe is jacketed, so that the sulphur is kept in a melted state by the steam, such as is used in the retort. The slight amount of fine dirt which unavoidably runs down with the sulphur through the perforations in the lead plate, alone prevents it from coming out in a perfectly pure condition. One great advantage in extracting the sulphur in this way is due to the very low heat employed which is not sufficient, as in the ordinary refining process, to cause the sulphur to attack the iron. The residues which remain are afterward treated for the cinnabar which they contain. The sulphur is shipped to San Francisco, the freight costing at present, $10 per ton.

For extracting the mercury from the cinnabar, three apparatuses are used. The richer specimens of ore and residues are put in retorts with lime, as is commonly practiced at New Almaden. The less pure ore which is found in lumps, is worked in continuous furnaces, in which it is filled up so as to admit the flame from the combustion chambers between the interstices. The fine ore is worked in a modified Gerstenhöfer furnace. In these continuous furnaces the mercury is condensed in iron chambers, from 8 to 10 of which are used for each furnace. It is found by experience, that the larger each of these chambers are made, the less "soot" mercury will be formed.

The passage of the mercurial fumes through these chambers is assured by means of suction currents produced by Root's blowers, and the draught afforded by a high chimney to which all the condensers are attached. With regard to the probable amount of mercury in this deposit, Mr. KEYES said, that according to the estimates of J. D. HAGUE, and Messrs. ASHBURNER & PRICE, the portion already exploited, viz., 3,000 x 1,000 feet, contained from one and one-half to two per cent. of the metal. This was for a depth of 75 feet, there being no indications that the deposit did not extend even deeper than this. Mr. VINCENT, an English engineer, estimates that the same one contains two and one-half per cent. of mercury, which would make it have a value of $40,000,000 at 50 cents a pound. The easy method of mining which is employed, being nothing more than quarrying in benches combined with the simple furnaces used for extraction, have enabled the Sulphur Bank Company to produce the mercury at an exceedingly low price. Mr. KEYES said that it could be made at as low a cost as 18 cents per pound. At the time of Mr. KEYES' visit a few months ago, there were from 20,000 to 30,000 tons of the lower cinnabar deposits ready to be roasted. Besides this deposit, another similar in character has been discovered on the other side of the lake, which is owned by the same company.

THE CALIFORNIA MINE OF THE COMSTOCK LODE is in legal trouble. A claim has been made for a one-twelfth interest in the mine on the ground that the company holds a fraudulent deed for the same, and as the claim is backed by strong *prima facie* evidence, and the 45,000 shares of stock which it represents are valued at about $4,000,000, there is every prospect of the California lawyers striking a bonanza.

THE PITTSBURG MOLLY MAGUIRES.—The well merited punishment which, thanks to Mr. GOWEN, President of the Reading Railroad Company, is overtaking the Molly Maguires of the anthracite region, has not deterred the unruly spirits in the Pittsburg mining regions. On the 2d instant the miners on strike at MOORE'S Youhiaghiony mines burned 16 houses, destroying some $8,000 of the Company's property and most of the personal effects of the miners who were inhabiting them. These were men who were willing to continue work at 2¼ cents a bushel, the price offered. The strikers asked 3 cents. The men are still out. They evidently need a MCPARLAN in the Pittsburg region, and a GOWEN to direct the prosecution.

SOME IMPROVEMENTS IN HOT BLAST STOVES.*

By James E. Mills, B. S.

THE process of reducing iron ores in the blast furnace involves the escape from the furnace of a certain proportion of incompletely oxidized or burned carbon in the form of carbonic oxide gas, even when charcoal or coke or anthracite coal is the fuel used, and in addition to this nearly all the volatile matter of bituminous coal when it is the fuel employed. So incomplete is the combustion in the blast furnace that, under very favorable conditions, the amount of heat developed is only about 45 per cent. of the total amount due to complete combustion in the case of coke or anthracite or charcoal, and in the case of bituminous coal only about 45 per cent. of the amount due to the complete combustion of its fixed carbon. Of the heat developed a portion is carried off as sensible heat in the escaping gases, and only about one-third of that which would result from complete combustion of the fuel employed is available within the furnace when the fuel is in the form of fixed carbon, and a much smaller proportion when it is bituminous coal. And it is impracticable to carry the combustion or oxidation of the carbon much farther within the furnace than is now done in the best practice, because the further oxidation of the carbon would prevent the deoxidation of the iron ore. Consequently the greater part of the calorific effect of the fuel must be obtained, if obtained at all, by burning the escaping gases outside of the furnace, and this method of economizing fuel, though of quite recent date, is almost universally practised.

The heat thus obtained is partly used in raising steam, and so converted into power to drive the blast engine and pumps, and other machinery of the plant, and a part of it is returned to the furnace in the blast.

The apparatus for conveying the heat of the burning gases to the blast (called hot-blast stove) is not without general interest to engineers, for, except apparatus for raising steam, perhaps no means of utilizing heat has been developed through more experimenting, or experimenting on a larger scale, since economy in the use of heat has become an exact science.

The blast passes through the apparatus on its way from the blowing engine to the furnace, and consequently under pressure which ranges from 1½ to 5 pounds, or even more, to the square inch. The amount of air to be heated of course varies with the consumption of fuel, but in favorable conditions of working furnaces is from 3.75 to 5 tons, and frequently 6.5 tons or more to the ton of pig iron produced. The temperature to which it is desirable to raise the blast in a well-designed, well-managed furnace, is at least 900° Fahr. I. LOWTHIAN BELL, the great practical investigator of the causes of consumption and means of economizing fuel in the blast furnace, considers that in a well-designed furnace of proper size there is no gain in raising the temperature of the blast above 500° C. or 932° Fahr. But in some furnaces at least it has been proved economical to raise it to 1,200°, or even 1,400° Fahr.

In designing blast heating apparatus, therefore, we have to deal with very large volumes of air moving rapidly under pressure, to be heated to a very high temperature, with fuel in a gaseous state; and to provide against excessive friction and loss of pressure of the blast in passing through the apparatus, and against breakage and wear by expansion and contraction through a wide range of temperature, and oxidation by exposure of hot metal to air, and the warping and fusion, and other destructive effects of the high temperature upon the materials employed in construction.

The various kinds of apparatus employed for accomplishing the work may be grouped in two classes. In one of these, the gases, while burning or after being burned, while still retaining the heat of combustion, are passed over masses of fire brick, which serve to catch and store up the heat within themselves until they have reached the proper temperature, when the hot gases are turned off, and the blast is driven over them and takes from them the required heat. To make the process constant there are two at least of such masses of fire brick through which the burning gases and blast are alternately passed. As a structure of fire brick cannot be made to be air-tight under the pressure and at the temperature produced, the masses are inclosed with a casing of plate iron. Such an inclosed mass of fire brick, with its channels for admission, passage, and exit of gases and air, and its inlet and outlet pipes, and its valves for regulating the flow and changing the course of the gases and air, in its most developed form, is the Whitwell stove.

In the apparatus of the other class the air is passed continuously through iron pipes, on the outside of which the gases are burning, and consequently receives its heat through the iron wall of the pipes. The pipes are arranged in an inclosed chamber, and the gases are burned in the same chamber, or in a combustion chamber beneath it. As the blast is inclosed in pipes, the fire brick walls of the chamber or stove do not require an iron casing.

The quantity of gaseous fuel escaping from the furnace is so large that the amount of heat which can be imparted to the blast is limited by the ability of the material employed in the construction of the stove, pipes, valves, etc., in which the blast is heated and conveyed to the furnace, to withstand the high temperature. The fire brick apparatus can of course bear much greater degrees of heat than any system of iron pipes, and consequently in the stoves of the Whitwell type the blast can be raised to a much higher temperature than in the other class. The disadvantages of stoves of this class are large first cost, considerable complication of parts, and great care required in the management of them.

The stoves with iron pipes have been much the longer in use, and on account of their comparatively small first cost and simplicity, will probably continue to be used quite generally at least at charcoal blast furnaces; and it is an object of importance to improve the stoves of this general type to the highest practicable degree of efficiency and durability.

They have gradually developed into rectangular brick chambers, with the iron pipes conveying the blast arranged in straight rows lengthwise or crosswise of the chamber, and the gases rising through long narrow slits in the floor between the rows of pipes. The gases are either burned in the spaces between the rows of pipes, or in a separate chamber below the one containing the pipes from which they pass up through the slits in the floor to the spaces between the rows of pipes. There are two kinds of pipes in each stove: one kind called bed-pipes consist of rectangular boxes, usually divided by a partition running lengthwise into two parts. These lie horizontally on the floor of the chamber. The other kind are of circular or elliptical cross sections, and stand vertically upon the bed-pipes and open downwards into them. They also are either divided into two parts by a diaphragm extending from the bottom to near the top of the pipe, as in the so-called pistol pipe, or are doubled upon themselves as in the so-called syphon pipe. In the case of the pistol pipe, the diaphragm rests upon the partition of the bed-pipe or a projection of it, and one apartment of it opens downward into one apartment of the bed-pipe, and the other apartment of the vertical pipe into the other apartment of the bed-pipe; and in the case of the syphon pipe, one limb opens into the bed-pipe on one side of its partition wall, and one on the other side. The blast enters the bed-pipe on one side of its partition wall, and passes up through an apartment or one limb of a certain number of vertical pipes, and down through the other apartment or other limb of the same pipes to the bed-pipe on the other side of its partition wall, thence by a horizontal connecting pipe to another bed-pipe to pass through it and its vertical pipes in the same way, and so on to the outlet pipe. There are many modifications of this general arrangement, but the essential features of the apparatus, as I have presented them, are common to all the best stoves of the class in general use.

There are serious avoidable defects in this general plan of stoves, which add to the first cost, and give rise to unnecessary wear of the pipes by oxidation and bending and cracking, and also unnecessary strain upon the walls, and whenever the temperature of blast sustained by one of these stoves is near the point of safe endurance of iron, the destruction of pipes and of walls is a source of considerable expense, and frequently of delay.

The rectangular form of the chamber gives rise to uneven reception and radiation of heat, and consequent uneven expansion and contraction of the walls, and renders necessary very strong binding with iron rods and angle-iron, and this does not generally prevent considerable bulging and cracking. The arrangement of pipes in rows parallel to two sides of the chamber leaves two interspaces in each chamber, bounded on one side by a wall and on the other by a row of pipes, and the flame in each of these two interspaces presents one broadside to a wall, and radiated heat directly to it, or, as is usually the case, the flame is omitted from these two interspaces, and one side of two rows of pipes is without heat directly radiated from the flame. When the gases are burned in a combustion chamber, one side of two rows of pipes is out of the direct course of the hot gases, or the inner surfaces of two walls are in that course. Again, by the usual arrangement, or any convenient arrangement with parallel rows of pipes, one side or end of the chamber must be hotter than the other.

About two years ago it became necessary for me to plan a hot-blast stove for a charcoal furnace to be built for the Midland Blast Furnace Company, and I had an opportunity to put into practice an arrangement which I arrived at in the endeavor to avoid the defects of the common plans, and secure the best practicable result from a stove of the class. The stove was built and has been tested, and the results of trial have proven the advantages of a plan which is theoretically—I think you will agree with me—better than those described; and to this I invite your more particular attention.

The stove proper has a cylindrical vertical wall, and a hemispherical roof or dome, like some potter's kilns. The exposed surface and consequent loss of heat by radiation and convection are therefore the least practicable, and so also is the amount of material in the wall. The absorption and loss of heat are very even throughout the wall, and consequently the different parts of it expand and contract evenly. The cylindrical form also reduces the necessary binders to simple hoops of sheet iron.

The pipes through which the blast passes are placed in rows arranged radially from near the center to near the circumference of the chamber; and the gases which serve for fuel are admitted through radial slits, one in each sector of the floor, and burned in the spaces between the rows of pipes. Therefore each sheet of flame presents both broadsides to rows of pipes, one on each side, and each row of pipes receives heat directly radiated from flame on both sides of it. There are six such rows of pipes, and consequently six interspaces and six sheets of flame in the stove actually built.

The blast coming from the engine enters a drum near the roof, and passes from it by six pipes extending outward and downward near the roof and wall of the chamber to the outer end of each of the six rows of pipes, and thence passes through the six rows to a drum in the middle a little lower than the drum before mentioned, and thence by an outlet pipe toward the furnace. The slits admitting gas through the floor approach one another as they advance to the center, and consequently the proportion of flame to space increases toward the center as far as to the inner ends of the slits. To insure complete combustion there is a chimney rising from the middle of the dome. The air for combustion is admitted through the outer wall at the level of the floor by an opening opposite the end of each of the slits which admit gas. The tendency of the hot gases and flame is toward the middle of the stove. The blast therefore travels in six streams toward the hottest place in the stove until it reaches the outlet pipe.

The nearness of the drum and pipes which first receive the blast to the roof and outer wall combines with the direction in which the blast travels, and the position of the flame and the direction of the draught to keep the outer parts of the chamber cool, and to reduce to the minimum the loss of heat through the walls, and the destructive effects of heat upon them.

I will now describe more in detail the stove which was built on this plan, and which is represented by the accompanying engravings.

The inside diameter of the cylindrical building is 18 feet 6 inches, and the radius of the dome 9 feet 3 inches. The height from the floor to the edge of the dome is 12 feet 4 inches, and to the center of the dome 21 feet 7 inches.

The foundation consists of a wall of sandstone rubble two feet high and 18 inches thick. The vertical wall is of fire brick 13½ inches thick, except the one foot at the top, which is 18 inches thick, projecting outward 4½ inches. The dome, which is also of fire brick, is 9 inches thick. It rests on the inner 9 inches of the vertical wall. Outside of it on the vertical wall, and flush with the outer surface of the latter are laid 13 courses of red brick, thus continuing the vertical surface of the wall on the outside about 31 inches higher than the lower edge of the dome, and encircling the lower part of the dome to that height. The wall is bound by three hoops of plate iron, 3-16 inch by 4 inches, one at the upper edge of the vertical outer surface of the wall, one at the level of the lower edge of the dome, and one 8 feet from the ground.

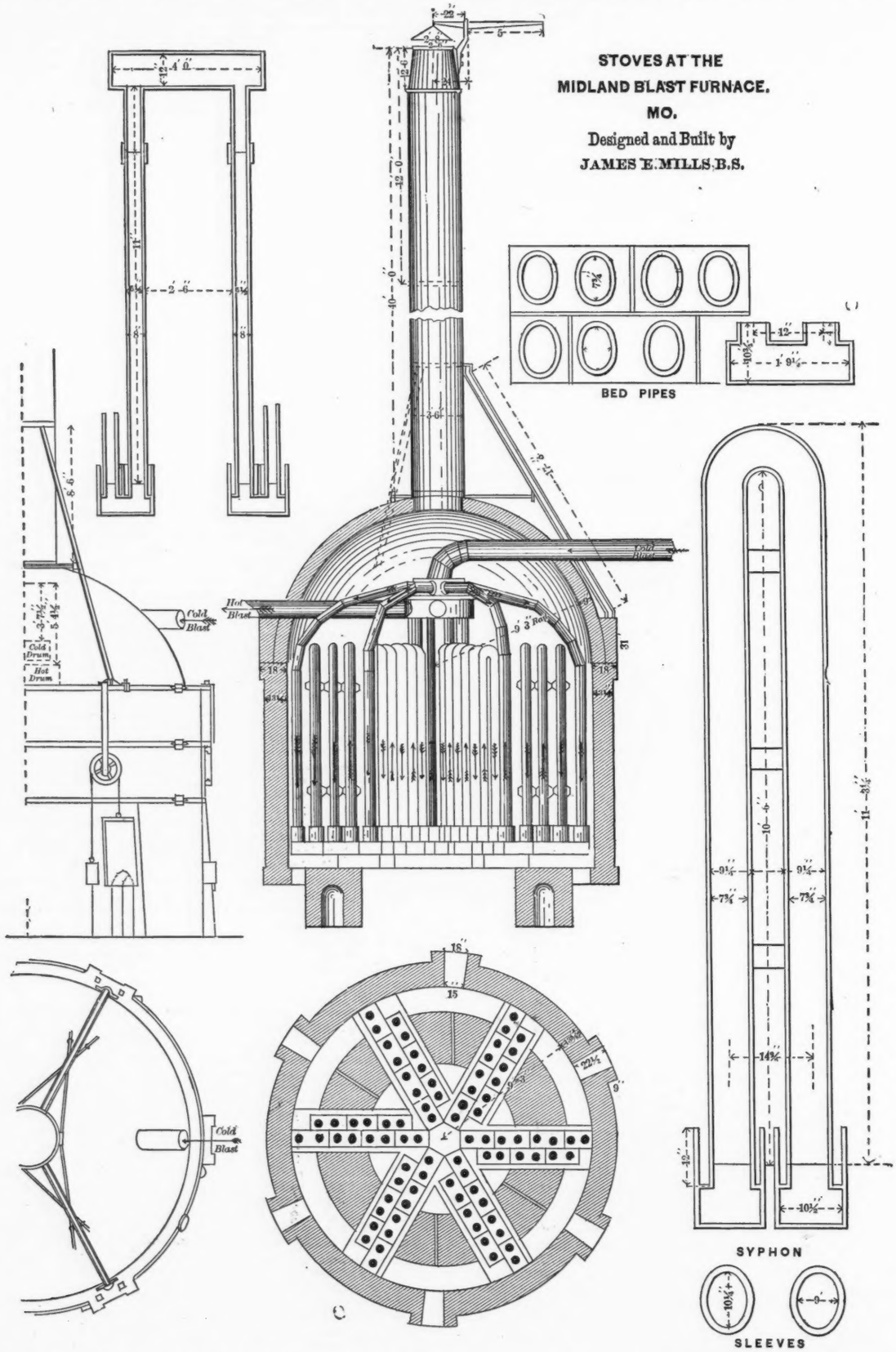
There are six small arched doorways in the vertical wall, at equal distances from one another, opening into the chamber midway of the outer side of the interspaces between the rows of pipes. They rise from the floor of the chamber, and are 4 feet high to the crown of the arched upper end, and 15 inches wide below the spring of the arch on the inner side, widening outward as much as is due to radical position of the sides. The doors are simple plates of fire-brick or tiles bound around the edge with a wrought iron band, to be opened and closed by being raised and lowered by pullies. To afford a sloping surface for the doors to rest and move upon, the jambs of the doorway and a portion of the wall above are made to project, beginning at a point twice the height of the doorway or 8 feet above the ground, and increasing downward so that the projection at the ground is 9 inches. By this arrangement iron doors exposed to

* A Paper read before the St. Louis Society of Engineers.

flame are avoided, and moreover the opening for admitting air being made by raising the door, is at the bottom of the chamber.

These doors have not yet been put on, but instead the doorways were filled in with fire-brick, leaving only small openings at the bottom to admit air. On both sides of each doorway is a peep-hole of the size to be closed by a brick placed in endwise. The doorways are large enough to admit the passage of the pipes and bed pipes but not of the drums. For admitting these a portion of the wall is arched over so that it could easily be taken out and replaced.

The flue for admitting the gas passes around under the floor and is annular, and its middle line makes a circle 12 feet in diameter about a center directly under the center of the chamber. It has a branch opening into it from the furnace. Where it passes under the walls of the building or the foundation stones upon which the pipes stand, it is arched over, and its cross section is 18 inches wide up to the spring of the arch, and 1 foot high to the spring and 1 foot 9 inches to the crown of the arch, but under the interspaces between the rows of pipes its walls continue vertical to the top, and it is covered over with



broad tiles, excepting a slit 3 feet long nearly in the direction of the radii of the chamber, and 3 inches wide. To obtain the length of 3 feet the slit is extended by a groove cut into the wall of the flue on either side. The slit can be narrowed and shortened at will by bricks placed on top of the tiles and moved from outside through the doors by a rod. The wall of the flue is 12 inches thick. The tiles covering the flue on each side of the slit can be raised, and through the openings thus made a man can reach the ashes and dust in the flue with a hoe, and move them toward the branch that comes from the furnace, and from the branch they can easily be raised outside of the stove. To facilitate the removal of the dust and ashes, and render it practicable while the stove was hot or comparatively so, three openings were made to the flue from the outside, but they were not used or needed, because, on account of the proportion of the area of cross section of the flue to the volume of gas moving through it, the dust and ashes did not accumulate in quantity to materially hinder the flow of the gas.

The foundations upon which the pipes stand consist of six stones, one under each row of pipes, placed radially like the rows of pipes, and extending from within two or three inches of the wall of the chamber to within one foot of the center They are about 8 feet long, and 1 foot deep and 2 feet 3 inches wide, except at the inner end, where one vertical edge is truncated, and the stone narrowed to fit the space for it. The material of the stones is sandstone.

A wall of fire-brick 4½ inches thick is carried up from the floor by the sides of these stones, between them and the spaces where the gases are burning, and still higher by the sides of the bed-pipes and the sleeves at the foot of the upright pipes, to a height in all of about three feet. These walls, with the outer wall of the chamber inclose on the sides the lower part of the spaces between the rows of pipes where the gases and air enter and meet, but they are all open above, and the free radiations of heat from the flame to the pipe is but slightly obstructed. The chimney rises 40 feet above the dome, is of sheet iron (No. 14) and is lined with three inches thick of fire-brick, from the dome to a height of 10 feet. Its diameter within the lining is 3 feet, and above the lining 3 feet 6 inches, till within 2 feet 6 inches of the top, where it narrows so that the diameter at the top is 2 feet 6 inches. There is a damper attached at the top, and for two lengths of sheets (about 5 feet) below, the iron is 3-16 inch thick. There is a guy band 12 feet from the top. The weight of the chimney does not rest on the dome, but is transferred to the upper edge of the vertical wall by three pieces of rail-road rails which serve as a tripod. Their outer and lower ends rest on cast iron feet lying on the vertical wall. At their inner and upper ends they are attached to the chimney at a point 8 feet 6 inches above its lower end. Here also is a sheet of iron 3-16 inch thick and a wrought iron band 6 inches x ¼ inch, and the rivets pass through the flanges of the rails and the band and iron of the chimney. The rails are stiffened and held in place by rods of ⅞ inch round iron inclosed in 1¼ inches gas pipe, and extending from midway between the two ends of each rail to the lower end of the chimney. This end of the chimney is stiffened by a wrought-iron band 4 inches x ¼ inch on the outside, and a piece of 2-inch angle iron on the inside, the latter serving to hold up the brick lining.

The pipe which conveys the blast from the engine to the apparatus is of wrought iron ⅜ inch thick, is 16 inches in diameter and opens downward into the top of the drum from which the blast is distributed to the six rows of pipes. This drum is of wrought iron, and is 2 feet 10 inches in diameter and 1 foot 3 inches long or high. It is situated directly under the center of the dome, and its lowest surface is 14 feet 9½ inches above the floor of the chamber. It has besides the openings for inlet and outlet of blast, three small man-holes closed with small man-heads, large enough to admit the hand and arm. Around the periphery of the drum are six cast iron thimbles, to which are attached, by flanges and bolts, the pipes which take the blast to the ends of the rows of pipes. These also are of wrought iron ⅜ inch thick, and are 7½ inches in diameter inside measurement, except at the lower end, where they are enlarged to lap down over the upper part of the short pipes or thimbles projecting upward from the bed-pipes. The joint at this connection is rendered tight by a sleeve 1 foot long, and rust packing.

The remaining pipes (syphons and straight pipes, and bed-pipes), and the sleeves, and the drum which receives the blast from the six rows of pipes, and the outlet pipes, are all of cast iron ⅜ of an inch thick.

The bed-pipes consist of rectangular boxes 21½ inches long, 10½ inches wide and 6 inches high—all inside measurements—with two short pipes or thimbles of same cross section as that of the syphon pipes, projecting 4 inches upward from one of the broadsides, and open at the outer or upper ends. The boxes lie on the opposite broadside, and are placed in six sets of radial rows, each set consisting of seven boxes in two rows, one of four and one of three boxes. The two rows are so placed side by side that one thimble of each box in the shorter row is abreast one of a box in the longer row, and the other thimble is abreast one in the next box of the longer row. The two rows are separated by a space 1¾ inches wide, and the boxes in each row by a space 1 inch wide. At each end of the long row is a thimble not paired with one in the shorter row. To the one at the outer end is connected the wrought iron pipe which brings the blast to the row, and the one at the inner end opens into the straight vertical pipe which takes the blast to the drum, which receives it from all the six sets of rows. On the six intervening pairs of thimbles stand the syphon pipes. One limb of each syphon stands on a thimble of one row, and one on a thimble of the above row, and by the arrangement of the boxes or bed-pipes, each bed-pipe in the short row receives air from one in the long row through one syphon, and delivers it through another syphon to another box farther on in that row, and as the blast passes from row to row and forward, till it reaches the last box of the long row and passes from it through the straight vertical pipe to the drum, which delivers it to the outlet pipe leading toward the furnace.

I have called the rows radial. The middle line of the long row of boxes or bed-pipes is exactly radial; of course the other row is not exactly radial, and the divisions of the floor of the chamber between the sets of rows are not exactly true sectors of a circle. The slit for admission of gas is placed midway between a short row of pipes on one side and a long row on the other, and each door is opposite a slit.

The syphons have an elliptical cross section with diameter 6½ and 7¾ inches, inside measurement. The centers of the two ends are 14¾ inches apart, and the pipes are so doubled upon themselves as to bring the long diameters of the two limbs into line. It is 11 feet ¾ inch from the lower ends to the top of the curve of the outside of the pipe at the junction of the two limbs.

The straight vertical pipes at the inner end of the rows have the same cross section, and are 11 feet long.

The drum which receives the blast from the six rows of pipes, and delivers it toward the furnace, is a cylinder 3 feet 10½ inches in diameter, and 1 foot long, or high, inside measurement, with a pipe or thimble, 1 foot in diameter (inside), and 4 inches long projecting from the periphery, which connects with the outlet pipe, and six pipes of same cross section as the vertical straight pipes, and two feet long, projecting from the lower end. These pipes rest on, and open into, the six upright pipes. The centers of their inner ends are each 1 foot 7 inches from the center of the bottom of the drum, and a line connecting them would form a hexagon with sides of 1 foot 7 inches. The outlet pipe is 1 inch in diameter, inside measurement.

The connections of the different castings are all made with sleeves and rust packing, the space between the sleeves and the pipes filled with the packing being ¼ inch wide. The sleeves, therefore, have a diameter 1 inch greater than the outside diameter of the inclosed pipes. A part of the sleeves are 8 inches, and a part of them 12 inches long. I would now make them all of the latter length, so that the packing might extend 6 inches either way from the joint, and for this purpose would make the thimbles on the bed-pipes, and the one on the drum, 6 inches, instead of 4 inches, long.

The amount of material in the whole apparatus is as follows.

Principal castings (by actual weighing):

42 bed-pipes	(average weight	228·88 lb.)	9,613 lb.
36 syphons	" "	1546·17 "	55,662 "
6 straight vertical pipes	" "	703·05 "	4,219 "
90 sleeves { 62-9 inches long	" "	64·09 "	4,024 "
90 sleeves { 28-12 inches long	" "	85·09 "	2,405 "
1 drum			2,053 "
1 outlet pipe*			955 "
1 sleeve to latter			184 "
Total			79,115 lb.

or 35 715-2,240 tons, essentially 35½ tons.

Wrought iron pipes and drum, and inlet pipe†, together with the small cast iron man-heads and thimbles and flanges, about	2,200 lb.
Wrought iron of the chimney, including cast iron damper (by actual weighing)	2,382 "
Three pieces of rail forming the tripod of chimney, about	850 "
The three-quarter inch round iron, and one and one-quarter gas pipe, serving as braces to the tripod	123 "
The castings on which the rails of the tripod rest, about	253 "
The wrought iron about doors and attachments, about	400 "
Cast iron pullies to doors, about	300 "
The three draw bands or hoops encircling the wall of the building (by actual weighing)	1 060 "
The fire-brick work in the building, including as much of the flue as is under the building, all tiles, lining of chimney, etc., about 1,315 cubic feet, or calling the cubic foot 20 bricks	26,300 bricks.
The red brick, 150 cubic feet, or	3,000 "
Stone in the foundation of the wall of the building	206¼ cubic feet.
The six foundation stones of the rows of pipes	123 "

The service thus far actually performed by this apparatus is as follows: The furnace to which it was attached, was in blast 137 days. After the first three days the blast was maintained very steadily at 900° Fahr. to the end of the campaign, or 134 days. The amount of air or blast heated to this temperature, averaged during the time 2,723 cubic feet per minute; and for a considerable portion of the time was over 3,000 feet. The reports based on the number of revolutions and size of the blast engine, make the amount of blast very much larger, but to avoid all error by leakage of pipes and other causes, I have given the amount received by the furnace calculated on the basis of fuel consumed, and probable composition of gaseous products of combustion. The Superintendent—Mr. WM. E. ROWELL—informs me that in arriving at the temperature of the blast, he carefully checked the readings of the gauge, by means of the fusing point of alloys.

The building proper shows no harmful effects of heat. The wrought iron pipes and drum are also, I believe, as good as when put in. No one of the cast-iron pipes or bed-pipes is cracked or burned through, nor is the drum. One or more of the six upright pipes are somewhat bent from the weight of the drum and outlet pipe bearing upon them while hot, and I would in future take this weight off by a small fire-brick pillar rising to the drum from the center of the floor of the chamber. Some of the joints leaked on account of defective packing. The pipes and flues were not cleaned during the campaign.

The apparatus performed all that was required of it for the furnace to which it was attached, without at any time being forced to the limit of this capacity or endurance, and yet I think all who are familiar with the subject will agree with me, that the performance recorded is unusually large, considering the size of the stove, and the amount of material used in its construction; and that it withstood the effects of the high temperature maintained during the campaign with unusually slight wear or destruction of parts.

*The part of the outlet pipe extending from the drum to the outside of the building.
†So much of it as is within the stove.

ABSTRACTS OF LECTURES ON MINING.—No. VIII.

By Prof. W. W. Smyth, M.A., F.R.S., Royal School of Mines, London.

(From the London "Mining Journal.")

WITH regard to the nature of lodes, we have seen that in the best known districts we generally find series of lodes well marked in their character, each series differing from the others in certain points. As exceptional cases we may find veins running in very different directions from the others, but nevertheless bearing the same minerals; as, for example, in the Duchy of Nassau and in Siegen. In these districts there are lodes running, as in the North of England, a little N. of E., and a little S. of W., and others running at nearly right angles to the first, nevertheless both yield magnificent ores of iron and ores of lead. And in the Isle of Man we have a fine lode coursing E. and W., and producing lead rich in silver, and another equally as good coursing N. and S. But usually some difference can be noted, as in Siegen and the Isle of Man, and Alston Moor; for example, as a general rule, the N. and S. lodes are apt to be very bunchy and unequal, and this is notably the case in Siegen.

We come next to a portion of our subject which from very early times has thrown great difficulties in the way of the miner—the subject of dislocations or heaves. It has not been till within the last few years that accurate opinions and reasonable hypotheses have been brought before us on these matters; and if we go back only as far as the last century we find a great deal of vagueness in the writings, and this we can trace back even to the time of Agricola, who wrote on this subject in the Middle Ages. Agricola saw clearly that disturbances were frequent in those districts where the lodes do their best, and he found

that in some cases where lodes crossed at right angles the two were fused together at the point of intersection, in other cases one lode ran right through the other. But more commonly one lode was found inclined to the other, and then it occurred that one of them was disjointed, or heaved, so that to find the other part of it you must go in a certain—or rather an uncertain—distance. This displacement may likewise occur with lodes intersecting at right angles. Agricola also observed that if there were a break the lode would be found again on the side of the larger angle. Then a large number of authors, especially German, wrote on the subject without making it much clearer, kept back by the peculiar views on geology held by the Wernerian school. Werner himself, who wrote a treatise in 1791, saw that these veins must have been the result of the dislocations of the rock masses. Schmidt, who wrote in 1810, was the first to put forward clear views on the subject, and since then the numerous observations recorded in the "Transactions of the Royal Geological Society of Cornwall," and in publications issued at Freiberg, more or less corroborate the views of that author.

We will first pay attention to these heaves considered in a perpendicular and then in a horizontal direction. And we will take a case which occurred a few years ago in the copper mines of Knockmahon, in the County of Waterford, Ireland. This is illustrated in Fig. 6, where A represents a portion of the lode discovered at the surface by surface trenching, etc. A shaft was sunk, as at S, for the purpose of intersecting the lode as usual, but they went down for some distance beyond the point at which they ought to have struck the lode, finding nothing whatever of it, nor could they find it in the galleries on either side of D. Why was this? They had not observed in sinking the shaft a little thread (B B¹) which passed through it, coursing in the same direction as the lode itself, but dipping in the opposite direction. The lode was, in fact, a heave, which carried the broken part of the lode to B¹, where it was subsequently found and worked. It shows us the necessity for noting carefully every such appearance which looks different from the ordinary joints of the rock. It was a false idea of the early miners that this sort of dislocation would be produced to a greater extent by a thick mass of hard material, and some of them went so far as to say that the stronger vein in point of hardness would dislocate the other. We may, I think, come to the opposite conclusion, and the miners will say that it is flooken which has the greater power—in other words, it is a joint of more recent character, accompanied by clay. The simple mode we have of determining where the continuation of the lode lies is that the broken point of the lode is lower on the side of the hanging wall of the dislocator, as will be seen in Fig. 6, where the lower point, B, of the broken lode is on the side of the hanging wall of the dislocator, B B¹. This is, in fact, the same rule which I mentioned to you in the case of stratified deposits. To this rule, however, as was the case with the beds, there are exceptions; and after paying great attention to these exceptional cases, I think I may say that where they occur the slide is an extremely flat one. In, perhaps, 49 cases out of 50 the general rule holds good, but we must be prepared to meet with exceptions.

FIG. 6.

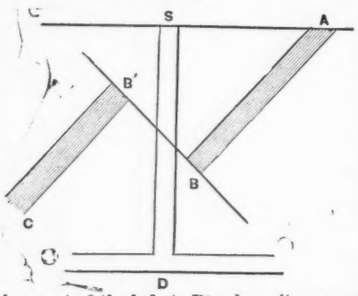


FIG. 7.

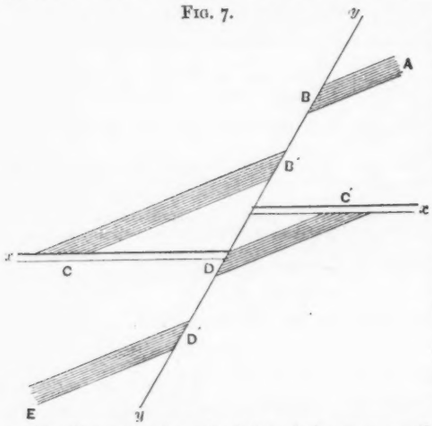
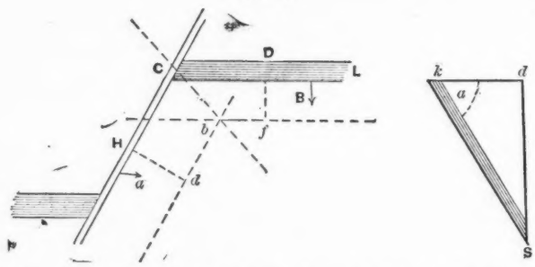


Fig. 7 is an illustration of a complicated set of phenomena, due to the combination of two heaves of different periods. The lode, A B C D E, was originally one continuous lode; it was then cut through and dislocated by the vein (x), and subsequently the separated portions of the lode, as well as the previous dislocator, were again displaced by a second dislocator (y), so that the originally continuous lode is now cut up into four limbs. This case occurred in a mine on the south flank of the Carpathians, in Hungary.

The district of St. Agnes, in Cornwall, where the lodes of tin are generally very flat in their underlie is one where a great number of these dislocators frequently occur, and almost invariably have the effect of heaving the lode, and there are instances where one lode has, in this manner, been brought to the surface two or three times; these dislocations are locally termed gossans. There are, again, other districts where such complicated phenomena are unknown. A cross vein intersecting a lode may displace it only to the breadth of the lode, or even less, so as to leave mineral on each side, or it may displace it several feet or fathoms. I do not know that there was ever a mine opened in the world where such a complication of these phenomena can be seen as the copper mine of Knockmahon. In the Museum above you will find an interesting model of Holmbush Mine, in Cornwall, showing some of these phenomena very distinctly.

On coming, then, to one of these dislocations, the question is—Which way shall we turn to discover the lost lode? We shall find various rules in various districts; some will tell us always to turn to the left hand, others to the right hand; some on one side of the greater angle, some on the side of the smaller. This occurs simply from the fact that the miners in each district have observed what has been the most successful method in their own district; but the variation shows us that it is desirable for us to have some more definite rule. Such a rule was first propounded by SCHMIDT, and to this we will turn presently. The cross-courses receive different names in various parts of the country—as flookan, spar courses, cross-courses, trawns (from the Latin *trans*), and guides, because by following them along they serve as guides to meet with veins which come into contact with them. They are filled with clay, quartz, iron ores, lead ores etc. The lode on the hanging wall has slipped, as it were, down the plane, or the relative movement of the sides has been equivalent to that, and in the case of an inclined lode this downward movement has the result of shifting the lode horizontally at a given spot; when, therefore, the miner comes to the cross-course, it is necessary that he be able to determine in which way to work in order to fall in with the lode again. She simplest way to get at the solution of this problem was proposed by SCHMIDT, and it is far more satisfactory than any we could get in a district as to right hand or left hand, small angle or large angle; and there can be no doubt that it is the result of philosophical conceptions of the nature of the movements which have taken place in the ground.

FIG. 8.



Let us take the case of a lode L, running east and west, as in Fig. 8, and intersected by a cross vein, x, and let them be laid down as in figure in our mining plan. We have first to determine the line of intersection of the two planes—the plane of the lode and that of the cross-course. It is important to determine this for two reasons—first, because we very frequently find it to be a line near or along which a run of rich deposit is likely to be met with; and, secondly, because it helps us materially in the solution of our problem. For this purpose it is necessary that we make out the strike and dip of both lode and vein, and indicate them on our plan, the dip being represented in direction by the arrows. We have already one point in the intersection—C. To determine a second, we draw two lines parallel, respectively, to the lode and the vein, at the same absolute level. Suppose the amount of dip of the cross-course to be a degrees, and of the lode b degrees, and if we take h to represent any vertical distance below the position of C, at which to draw our levels, then the distance ($k\,d$ at which we must draw our parallel to the vein will be found by the formula:

$$k\,d = \frac{h}{\tan.a}\text{; and the distance, } D\,f = \frac{h}{\tan.b}.$$

For if in Fig. 9 $k\,s$ represent the dip of the cross-course, making the angle a with the horizontal $k\,d$, and $d\,s = h$, that is the depth of the level we have chosen, then obviously

$$k\,d = \frac{h}{\tan.a}\text{; similarly with } D\,f.$$

If, then, we draw these parallels, the point of intersection, i, will be another point in the line of intersection of the planes of the lode and vein, and we can now draw that line of intersection through C and i. Now comes SCHMIDT'S rule: Strike a perpendicular through the dislocator, and on whichever side of the line of intersection that perpendicular falls, it is on that side you must drive. Thus, in Fig. 9, continuing the cutting of the lode through the dislocator at C, the perpendicular would fall on the left hand side of the line of intersection, and, consequently, according to the rule, the broken part of the lode will be found on that (left hand) side; in other words, drive away from the line of intersection, not through it.

Mr. HENWOOD in his work has tabulated a large number of observations, and he found in the lodes he examined that 22·7 per cent. were intersected by cross-courses, and not heaved; the proportion heaved to the right hand 51·1 per cent., and to the left hand 26·2; so that the miners are not so far wrong in saying that you have a greater probability of coming to the lode on going to the right hand than to the left; but, from the variations I have referred to, it is evident we cannot always rely on that rule. Those heaved to the side of the greater angle were 63·5 per cent.; to the side of the smaller, 12·9; and the mean distance of throw was 16·4 feet. The rule of SCHMIDT will be found to hold good in the great majority of cases, but there are certainly some cases in which it does not.

COKING INDIANA BLOCK COAL.*

By John S. Alexander, Philadelphia.

THE typical block coal of the Brazil (Ind.) District, differs in chemical composition but little from the coking coals of Western Pennsylvania. The physical difference, however, is quite marked; the latter has a cuboid structure made up of bituminous particles lying against each other, so that under the action of heat fusion throughout the mass readily takes place, while block coal is formed of alternate layers of rich bituminous matter and a charcoal-like substance, which is not only very slow of combustion, but so retards the transmission of heat that agglutination is prevented, and the coal burns away layer by layer, retaining its form until consumed. This characteristic permits the use of raw block coal in the furnace, but theoretically interferes with coking; therefore, coals of this class are usually denominated non-coking. Contrary, however, to this popularly received theory, a very excellent coke has been produced at the Brazil Furnace in ordinary bee-hive ovens; so successful has been the experiment, that the proprietors of the furnace, Messrs. GANDES, ROOT & GARLICK, have created twenty ovens, and this coke is now employed by them to the exclusion of the heretofore used Connellsville as a mixture with the raw block coal; the proportions being about one-fifth coke and four-fifths block coal.

The ovens are 12 feet in diameter, and 6 feet high; the usual charge is 3½ to 4½ tons of the raw coal, and the contents are drawn in fifty-four hours. The coke has a bright and silvery appearance, and retains the shape and peculiar

* A paper read before the American Institute of Mining Engineers, at the Cleveland meeting, October, 1875.

stratification of the coal. In fact these characteristics are so preserved, that the process might more properly be termed charring than coking.

An analysis of the raw coal by Prof. Cox, State Geologist of Indiana, is as follows :

Coke	60.55	Ash, white	2.60
		Fixed carbon	57.95
Volatile matter	39.45	Water	2.10
		Gas	37.35
	100.00		100.00

Phosphorus .096
Sulphur .073
Spec. gravity 1,232 | Weight per cubic foot. 77 lb.

Two assays by the same analyst gave, respectively, 4 per cent. of ash in the coke made from the center of the vein, and 6 per cent. in that made from the more richly bituminous coal of the top and bottom of the seam ; thus affording, by difference, an unusually high percentage of carbon. The sulphur and phosphorus were not determined, but from the analysis of the coal just given, it may be inferred that the merest trace of these deleterious substances is present in the coke. According to an analysis in SAWARD'S "The Coal Trade" the composition of Connellsville coke is as follows : Carbon, 87.456 ; ash, 11.382 ; moisture, 0.490 ; sulphur, 0.639 ; phosphorus, 0.029. This large percentage of ash is probably due to the very considerable quantity of slate found in the coking material ; a trouble from which the block coal in question is entirely free. It will thus be seen that, chemically, the Brazil coke is all that could be desired, and from the following *data* taken from the books of the Brazil Furnace, which were kindly placed at my disposal by Mr. E. C. GARLICK, one of the proprietors, a knowledge of its behavior in the furnace will be obtained. As an average week, that ending September 4th last, was selected ; during this period the furnace received 410 charges of 1,800 lb. of raw block coal ; 350 lb. of Brazil coke ; 700 lb. of limestone ; 950 lb. of Simmon's Mt. ore ; 475 lb. of Iron Mt. ore ; 475 lb. of Lake Superior specular ore ; and 120 lb. of furnace scrap. The product was 212 1920-2240 ton of pig metal graded as follows : No. 1 foundry (Bessemer) 35 per cent. ; No. 2 foundry (Bessemer) 9.5 per cent. ; and No. 3 Bessemer, 55 per cent. Turning back, it was found that during the week ending November 21, 1874, 411 charges entered the furnace, each charge consisting of 1,800 lb. of Connellsville coke ; 825 lb. of limestone ; 1,050 lb. of Lake Superior specular ore ; 525 lb. of Michigammi magnetic ore ; and 525 lb. of Lake Superior (Salisbury) hematite ore. The product was 217 1820-2240 tons, graded as follows : No. 1 foundry, 41.4 per cent. ; No. 2 foundry, 8.5 per cent ; No 3 Bessemer, 38.6 per cent. ; and No. 2 mill, 11.5 per cent. Pig metal from this furnace is in active demand for Bessemer purposes, which proves that the product is of a superior quality.

With block coal at $1.50, this coke can be produced at a cost within $3 per net ton ; whereas, Connellsville, after being delivered at Pittsburg, must be transported 438 miles by rail, at a cost never less than $4.50 per ton, which, added to the lowest quotation at Pittsburg, $2.50, brings up the cost to $7 per ton, at the furnace ; the importance of this new industry to the iron interest of Indiana is, therefore, easily apparent.

NOTES.

MARCHANT'S NEW PUMPING PROCESS.—A novel experiment was commenced in July, with the 80-horse power engine in Portsmouth Dockyard. It was with a new pumping process, by which the inventor, Mr. R. M. MARCHANT, of Hatton Garden, undertakes to return saturated steam to the boiler of any engine, instead of condensing steam from the condensers. In other words, after the steam has exerted its power in the cylinder, the manufactured article itself is to be taken up and re-pumped into the boiler so as to be used afresh. Mr. MARCHANT claims for his invention that he is able to re-pump steam into the boiler without any expenditure of fuel beyond that which is required to overcome the mere friction of the pumps, and without subjecting them to pressure. The inventor contends that by the law of gases the pressure exerted by steam on one side of the piston represents by its elastic power, as in the case of the resistance of a spiral spring, the same expression of power in pressure on the other side of the piston ; so that the elastic charge is always ready to give back the exact power expended to the purpose of its expression Consequently, if Mr. MARCHANT'S reasoning be correct, he expects to be able to return in volume and pressure to the boiler the equivalent of the power expended on the pumps, and so to apply the steam again to power. It, therefore, follows that, inasmuch as returning boiling water into the boilers saves the cost of re-boiling it, to return steam into the boilers as steam will save the far greater cost which is expended in manufacturing it. As steam costs 75 in the 100 of the fuel which is consumed in its production, the saving which will be effected by the successful application of the principle will be great.

METALLURGY OF SILVER IN THE MOIST WAY.—M. ANTONY GUYARD (Hugo Tamm). —This paper is devoted to the treatment of the sulpho-antimoniuretted ores of Bolivia, known as *Rossicler*—very rich, but so difficult to treat in the dry way that many smelters refuse to work them. They may, however, be very advantageously treated in the moist way, the sole condition of success being the use of a quantity of acid sufficient to oxidize the sulphur and all the metals. The following analyses show the general composition of these ores :

	1.	2.	3.
Sulphur	18·35	16·20	17·85
Silver	48·15	46·10	38·10
Antimony	10 85	7·10	28·35
Iron	5·60	7·70	0·95
Zinc	4·50	4·10	5·25
Bismuth	2·20	....	....
Lead	traces	traces	1·50
Arsenic	0·15	0·10	5·25
Copper	....	....	....
Chlorine	....	0·15	....
Gangue	10·20	18·55	7 50
	100·00	100·00	100·00

—*Bulletin de la Société Chimique de Paris.*

NEW CALEDONIA AND ITS NICKEL MINES.—An experienced Victorian miner and mine manager, who has recently returned from a lengthened visit to New Caledonia, whither he was sent on a tour of inspection by some Melbourne capitalists, has supplied to the *Melbourne Argus* an account of what he observed. The principal nickel mines now being worked are, he states, on the east coast of the island. The Ballard Mine, at Onilaw, and M. HANKAR'S mine, at Kaunala, are the most important, their output of ore being of the value of about £1,000 per month. Most of it is sent to France. Contracts have been entered into under which all the ore that can be produced will be taken by continental European countries, and the demand is much greater than can be met until more mines are opened up. Most of the capital invested in the mines now at work is Melbourne capital. The Bank of Noumea advances freely upon ore at the rate of from £20 to £25 per ton on ore yielding 10 per cent. of metal. The metal is worth 14s. per lb., at which price the American Government purchases nickel to be used as an alloy in its silver currency. Certain continental nations use it in the manufacture of their smaller coins. The demand for the metal is understood to be practicably unlimited. If only there was reasonable assurance of a considerable and steady supply it would be introduced into several of the manufacturing arts in which it has not yet found a place. Melbourne silversmiths would use it extensively if they could get it. Arrangements are now being made with a view to the further introduction of Australian and British capital into this new field of enterprise. Noumea is 1,050 miles distant from Sydney, and is reached by steamship in about four days. The mining regulations of New Caledonia seem to have been framed on Victorian models with some improvements. There are no Wardens in its system, the commandments of the several military districts into which the island has been divided exercising what local authority may be required. Miners' rights cost 25 francs per annum, and consolidated rights are issued at the same rate per man for any number of miners, for a period not exceeding five years. Visitors to New Caledonia must enter at the Port of Noumea, and clear out from the same port, unless special permission is obtained to the contrary ; but this indulgence is seldom granted. British and Australian residents in Noumea find themselves subject to regulations against which they feel greatly inclined to rebel, and against which they loudly protest. On all except Sunday nights a gun is fired at 10 o'clock, when all business must cease, public-houses be closed, and everybody must retire to his own home. The ordinary routine of work, rest, and recreation is prescribed by the authorities.

INTERNATIONAL EXHIBITION OF 1876.

Special Report of the Engineering and Mining Journal.

ADMISSIONS FOR THE WEEK ENDING AUGUST 15, 1876.

Date.		Paying Visitors.	Press, Complimentary, and Exhibitors.	Total Visitors.
Previously reported		1,738.576	770,028	2,508,604
August 2	73d Day	24,246	7,858	32 104
" 3	74th "	27 940	8,009	35,949
" 4	75th "	25,015	8,046	33,061
" 5	76th "	22,304	8,141	30,445
" 7	77th "	23,401	8,715	32,116
" 8	78th "	24,059	7,708	31,767
" 9	79th "	29,938	7,829	37,764
" 10	80th "	26,155	7,561	33.716
" 11	81st "	25 893	7,829	33,722
" 12	82d "	22,314	7,963	30,277
" 14	83d "	22,664	8,512	31,176
" 15	84th "	25,346	9,471	34,817
Totals		2,037,851	867,667	2,905,518

THE UNITED STATES COMMISSION ON GOLD AND SILVER VALUES.

THE concurrent resolution providing for the appointment of a commission to inquire into the change which has taken place in the relative value of gold and silver, etc., as passed the two houses of Congress, reads as follows : That a commission is hereby authorized and constituted, to consist of three Senators, to be appointed by the Senate, three members of the House of Representatives, to be appointed by the Speaker, and experts, not exceeding three in number, to be selected by and associated with them, with authority to determine the time and place of meeting and to take evidence, and whose duty it shall be to inquire first, into the change which has taken place in the relative value of gold and silver, the causes thereof, whether permanent or otherwise, the effects thereof on trade, commerce, finance and productive interests of the country, and on the standard value in this and foreign countries.

Second, into the policy of the restoration of the double standard in this country, and if restored what the legal relation between the two coins, silver and gold should be.

Third, into the policy of continuing legal tender notes concurrently with the metallic standards, and the effects thereof upon the labor, industries, and wealth of the country.

Fourth, into the best means for providing for facilitating the resumption of specie payments, and said commission is authorized to employ a stenographer and shall report on or before the 15th day of January, 1877, with the evidence taken by them, and such recommendations for legislation as they may deem proper.

The Congressional members of the commission are Senators JONES, of Nevada, BOUTWELL and BOGY, and Representatives GIBSON, BLAND, and WILLARD.

The Commission met August 16, with all the members present, excepting Representative GIBSON, of Louisiana. As the members were all anxious to leave the city as soon as possible, no steps were taken for transacting any business, and the Commission adjourned to meet in New York, on September 11, at which time the three experts will be appointed, the duty of appointing which devolved upon the committee.

REFRACTORY MATERIALS.*

By T. Egleston, Ph. D.

(*Concluded from page* 104.)

EVERY person using clays should endeavor to get a certain knowledge of their properties by assay. There have been a number of these assays published. The two simplest and best are, the one proposed by BISCHOFF, and the foil assay.

BISCHOFF'S assay is based on the comparison of every clay with one from Garnkirk, in Scotland, which is taken as a type. For this purpose, the clay to be examined is mixed with one, two, three to ten parts of quartz. It is then raised to a known temperature and compared. If the clay, with three parts silica, acts like the Scotch clay with one, it is called three, and so on. The best and simplest assay seems to be one made by the blow pipe, which consists in mixing a small quantity of clay with water, and then spreading it out carefully on a piece of platinum foil in a very thin sheet, which when completely dried is submitted to the flame and compared with clay of known fusibility prepared in the same way. Very few clays can be used as found. They must be, as it were, suspended in some infusible material, which will prevent, as far as possible, the mechanical effects of the heat, and allow, at the same time, of a certain amount of expansion and contraction, while preventing both

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February, 1876.

in too great a degree. These materials are generally called "lean," that is, they do not make a paste with water and require some binding material to keep them together. They are usually quartz sand or pulverized quartz, burnt clay, old bricks, serpentines, talc, graphite in powder, and not infrequently small coke, when the ash is not to be feared, and when graphite either cannot be had, or cannot be used on account of its high price. Some few clays from Spain contain this material, which comes from the decomposition of talc shale in which they have been suspended by nature, but this is a rare exception. The mixture must generally be made artificially. Of all these substances quartz sand is the cheapest, but it has been found by experience that round grains of sand are less liable to become thoroughly incorporated with the binding material than the angular pieces of crushed quartz, so that when a very refractory material is required crushed quartz is always used. As the clay contracts, and quartz expands, a mixture may be made which will not change its form ; but in a given case this may not be the best mixture for a special use. If the material has only to resist great heat, an excess of quartz is preferable ; but if it must also resist the corrosive action of basic slags, clays burnt at a high heat, graphite or coke can be used. When the mixture is made in the place where it is to be used, without previous burning, it is generally made of one-fifth plastic clay and four-fifth burned clay or quartz, or one-fourth lean clay and three-fourths burnt clay or quartz. This is done to avoid contraction. It is a most economical construction, even in blast furnaces, and is coming more and more into use.

The clay, when mined, is left exposed to the air under sheds, and is cleaned and carefully dried, and is afterwards mixed with the substances with which it is to be incorporated, which are classified by numbers, varying according to the size of the sieve holes through which they will pass. The quantity and quality of the mixture will determine the refractory nature of the material to be produced. A friable paste with large grains, and quite porous, resists a great heat. One with fine grains close and compact splits at a high heat, especially if it is not homogeneous. The manner in which the mixture is made also influences the quality of the brick quite as much as the material. In some works in Belgium, after taking all the ordinary precautions to make the mixture perfect, it is submitted to a succession of shocks continued for some time, until it is found by experiment that the materials are perfectly mixed. It has been found by long experience that the bricks so made kept their form perfectly, while others made of exactly the same mixture in the ordinary way contract. The quantity and size of the mixture depend upon the size of the article to be manufactured. When coarse grains are used, greater thickness must be given to the sides of the articles if they are hollow, and they must be made larger if they are solid, thus giving a mechanical cohesion where a chemical one is wanting. The usual quantities of the mixture are two-fifths to two-thirds of the substances added to two-fifths to one-third of the clay, these quantities being determined by volume and not by weight. When coke dust is used it does not seem to have any decided effect beyond one-tenth. The action of coke or graphite is to decompose the metallic oxides as they form, and thus prevent their union with the material of the crucible. Coke may be profitably used in the place of graphite when the ash is in small quantity, free from iron and highly aluminous. Beyond two to three per cent. graphite cannot be profitably used, as it weakens the article and renders it liable to break. The mixture which gives the very best results for small objects is, however, worthless for large. It will generally be found that the pieces which crack up and down in drying have had too much material mixed with the clay, and those which crack laterally have had too much clay.

The very greatest importance is attached in some industries to not having a mixture made by a machine. In most places even to this day the inhuman method of heel treading is used, because either from the fact that more care is exercised, or because smaller quantities are mixed at once better results are obtained. The more the operations of mixing are repeated, the better the material, and it is undoubtedly true that with mechanical means such a homogeneous paste is not produced as can be made by human labor, because the whole object of the machine is to operate on large quantities at a time.

The paste made, and the article completed, it must be dried or "tempered." This is commenced in the open air, and if possible out of the draft. If the draft cannot be excluded, the place where the drying takes place is slightly heated, commencing at a temperature from 60° to 70° Fahr., and keeping it up from 25 to 30 days, then increasing it from 80° to 100°, leaving the article as long as possible, and so on, an active ventilation, but the same temperature being kept up. The article should remain in a temperature of from 150° to 180° for at least six weeks. Bricks do not generally require so much care ; but crucibles and retorts do. Long experience has proved that there is a great economy in conducting this process of tempering as slowly as possible, and that it influences materially the refractory nature of the article. It is found by actual experiment in crucible works, that those crucibles made from the same mixture, tempered during six to eight months, last more than three times as long as those which had been tempered only two ; so that in general the older the article before being burned the better. This desiccation, while perhaps it is the most important part of this manufacture, is undoubtedly the one most neglected. A poor article well tempered, is often better than the best which has been hastily dried. By working rapidly, and filling up cracks as they form in a too rapidly heated drying house, with a very liquid material, in order to secure complete penetration, both time and money are lost. The material never lasts nearly so long as when slowly dried. In the works at Andenne, in Belgium, large pieces, like glass house pots, are kept six months in the drying house before they are burned, and during this time the greatest care is taken to prevent drafts, and in allowing any air colder than the drying room to strike them. Leaving the door of the drying furnace open has been known to crack the pieces, which had been up to this point most carefully prepared and tempered.

In reviewing the effects which the different elements which constitute refractory materials have, we find that the same element often produces exactly contrary effects, according to the proportion in which it is present, and that there is nothing anomalous in those effects being so produced. Silica causes expansion when highly heated, so that the molds in which the bricks are made must be smaller than the brick is to be. Every mixture has its own peculiar rate of expansion and contraction. This expansion not only takes place when the bricks are made, but if when used they are submitted to a higher degree of heat, they expand still further, and contract again on cooling to such an extent, that at Dowlais the tie rods of the steel furnace are slackened when the furnace is getting into heat, and are tightened again as it cools. At Crewe, this is made self-acting by means of springs. At Creusot the furnace casing is made so strong as to resist the pressure, so that the centre of the roof arch must rise and fall, to allow for the expansion and contraction. When neutral brick must be had for any reason, it is mixed with just enough clay and burned brick to make it keep its form, and such a brick is generally less fusible, as it contains less silica.

Alumina alone, or with silica in the proportion of 30 to 38 per cent., is very refractory ; but three per cent. of it in a silica brick makes it fusible. In clay, or pure, it tends to contract, and this tendency is greater as the alumina is in greater quantity, and the heat of manufacture has been low, but when it has been very highly heated at first, it afterwards undergoes but little change. Though both silica and alumina affect each other so unfavorably, BISCHOFF found that four of alumina to one of silica or two to one, or one to one, only sintered before the oxyhydrogen blowpipe, making masses with a granular fracture. One of alumina to two of silica was fusible like porcelain, but still somewhat granular. One of alumina to four of silica, and one of alumina to six of silica melted like a thick enamel, which shows that the acid silicates of alumina are much more fusible than the basic. He also found, that a mechanical mixture of alumina and silica was less fusible than the same amount in a natural combination, and that in general silicates already formed are more fusible than a mixture of their constituents. The general property of alumina, when mixed with other substances, is to bind them together. When combined with iron or other bases alone it makes infusible aluminates ; but if silica is present, it fuses more or less easily. It is generally conceded that the proportion of alumina in a brick should be between 10 20 and 75 per cent.

The alkalies in small quantity make a brick fusible. There is a great difference of opinion among those who have studied this subject with regard to the quantity. Mr. SNELUS states positively that 1 per cent. of alkalies in an otherwise good material makes it too fusible to withstand high temperatures. Mr. RILEY states, with equal positiveness, that he has found brick containing 2·73 per cent. of potash to resist the greatest heat of a Siemens-Martin furnace. It is probable that both are right, and that in the special cases alluded to, the peculiarities were owing to the association of elements. In any case, a material with a very small percentage of alkalies cannot be used.

Lime alone is completely infusible ; but in very small quantities in a clay, it makes a brick fusible at high temperatures. One per cent. of it with silica makes the most infusible brick known. Magnesia in small quantities makes the clay fusible. In very large quanlities it is very refractory. Alone, it is entirely infusible.

Oxide of iron in the absence of alkalies, may be present in small quantities without seriously affecting a clay, unless it is to be used for melting steel. If alkalies are present, any proportion of iron would make such a clay worthless, If no silica at all is present, five or six per cent. may not damage it. In a silica brick 2 to 3 per cent. of iron makes the brick worthless. If the iron was always certain to remain in the state of a sesquioxide, its compounds would be much more infusible, and a large percentage would do no injury ; but some of the sesquioxide is certain to become reduced to protoxide in the presence of reducing gases, and the result is a very fusible compound in the presence of silica.

There is a still more deleterious and dangerous effect of iron in fire-brick, because its effects are produced, not at a high heat, but at a comparatively low temperature. It is well known, since the researches of BELL and others, that when a brick, containing iron, is exposed even at a low temperature to gases containing carbon, and that part of this carbon is deposited near the iron; this has often not only caused the brick to lose its cohesion, but may even burst it, so as to throw down the iron walls of furnaces, and the linings of flues. The presence of iron is, therefore, doubly to be dreaded, as its presence is quite as deleterious at low temperatures as at high.

As much as one per cent. of titanium has been found in some clays. Little is known about it ; but it appears to act like silica.

BISCHOFF found that 20 per cent. of magnesia, 28 of lime, 47·1 of potash, or 40 per cent. of iron, had exactly the same effect in making the clays fusible, and that when 4 and 2 of the different bases were used, the relation was striking, and in about the same order. The quantity of other substances necessary to make a compound fusible, depends upon the quantity of silica present—the more the silica the less the quantity. It will thus be seen that while the predominance of any one element will materially affect the nature of the materials, it is more the way in which the different ingredients are grouped together than their individual percentage, which affects the nature of the brick, and frequently, above all these, the mechanical and molecular arrangement of the particles which determines its commercial value.

The essential qualities of a good brick may be stated as follows : first, uniformity ; second, regularity of shape, and the power to retain it under all circumstances, which involves perfect unity of composition ; third, strength to resist the different pressures required under different circumstances ; and, fourth, its cheap price. No material yet manufactured fulfils all these conditions ; but there seems to be no reason why, with the proper investigation, a material should not be made which will fulfil most of them. The metallurgical world is nearly agreed that the refractory material of the future must be made artificially, and that it is hopeless to look for it among natural products. No brick can come up to the modern standard of infusibility, which contains five per cent. of iron, or three per cent. of combined alkalies or alkaline earths, yet the most infusible brick that is known, which in the roof of a Siemens-Martin furnace will resist during 250 charges, and then wear out by abrasion, when required to come in contact with metals, oxides, and alkalies in a spiegel cupola, will hardly stand twenty-five heats, while an iron pipe coil, which is easily destroyed by heat, will last almost indefinitely in the same cupola, provided only a sufficient stream of water is run through it. Different furnaces, and different parts of the same furnace should, therefore, be treated differently, instead of being treated by the same Procrustean methods, as is frequently the case. If silica makes the best roof, it makes the worst hearth. Alumina, when present in very large quantities, even in the presence of a small amount of silica, makes compounds which are almost infusible, so that it should be used for the fire bridges and hearths, and not put into the roof, where its tendency to contract would endanger the structure of the furnace.

Far too little attention has been given to the abrasive and corrosive power of coal dust and ashes carried by the draft, in gradually cutting and fluxing away the parts of the furnace exposed to its action, and many qualities of brick which are infusible in the assay, owe their small power of resistance to its effect. A brick to be used where is to be exposed to such action, should always be tested by placing it for a considerable time on the bridge of the furnace where it is to be used, for the destructive effects of this almost unobserved agency seems to be greater than those of long continued heat.

A good brick should not only resist high temperatures, but sudden changes of temperature, without alteration of any kind, such as crushing, splitting, etc.,

and at a high temperature should undergo the least possible change of form. In general, it may be said, that bricks which have undergone a very high temperature in the manufacture are less likely to contract afterwards. Shrinkage is generally due to insufficient burning, or to a too small proportion of old material in the mixture, and generally occurs in aluminous bricks. Its chief evil is in allowing the flame to penetrate the open joints and give the dust an opportunity to cut between the bricks, for any cause which produces eddies in the flames, such as hollows or projecting surfaces, is certain to effect the destruction of that part of the furnace. Silicious bricks have, on the contrary, a tendency to expand under the influence of intense heat. This is true to such an extent that in the steel furnace where they are used provision must be made for slackening the tie rods when the fire is being raised, and tightening them when it is being cooled.

The crushing weight of an ordinary fire-brick, cold, is from 600 to 1,000 pounds, but some of the best have been known to resist as high as 3,000 pounds to the square inch. To insure the safety of the structure, and the success of the process, it should not only retain its power of resistance, but should not undergo any change of form nor soften materially under long continued heat, and at the highest possible temperature should support more than double the strain required without attention. In the walls of the fire-place those bricks will be best which are dense, and contain an excess of silica. In the hearth they should contain an excess of alumina. In the arch they should be nearly pure silica, alumina, or magnesia. Bricks in a roof give out from shrinkage, cracking, or splintering. Splintering takes place when silicate bricks are made of impure mixtures, usually from too much fine material and from imperfect burning. Bricks which are liable to splinter are generally cross grained and dense, with a smooth conchoidal fracture, when made from improper mixtures, and when from bad burning they generally ring like a cracked vessel. All good bricks wear off evenly.

No matter how good a material may be, if its price is so high as to prevent healthful competition, it might as well not exist. Hence any effort to furnish a good material should have for its aim to produce it at the least possible cost.

In discussing a refractory material in a given locality, there is to be taken into account—first, the clay and other materials to be had; second, the ore or metal to be treated; third, the fuel to be used; and fourth, the foreign substances in the gangue of the ore or metal. Whether to use one clay, or a mixture of calcined or raw clay, must be determined by direct experiment, and then the size of the grains of the mixture for the given use, must be determined. for each substance is more or less refractory, according as it is coarse or fine. Thus in Belgium, a porous material with a large grain is used for blast furnace brick, but a fine material with a close grain for coke furnaces, the chemical composition being the same in both cases. It must then be ascertained whether the mixture contracts or expands, for there are clays that contract and expand between one-thirty-second and one-eighth. The way in which the material tempers must then be carefully studied. It is not sufficient to have a good material, for almost as much depends on its manipulation as on the material itself. To temper properly, the clay and the manufactured article should both be dried gradually and uniformly. It must be fired evenly, and the temperature slowly raised to the proper point. If it is to be used in the run state as ganisters, it must be equally moist throughout, so as to dry uniformly, and not so wet as to cause it to crack in drying, or so dry as to prevent its binding. The brick, or other material, once made, should be kept from dampness; as it is porous, and likely to absorb moisture, they should be heated before being used in the furnace, and put in as hot as it is possible to handle them. If the furnace is in blast, this requires a special furnace, and a high heat. If it is to be put in blast at once, especially with silica bricks, the temperature should be as high as the hand can bear, If the furnace is to be a long time standing, this precaution is not necessary, but in the two last cases the furnace must be dried very carefully and slowly, No brick which has been dressed should ever have the dressed face exposed to the flame. Without the observation of these precautions, a really good brick may a very bad result. It is too much the habit of this age to be in a hurry to get results, and this has led some blast furnace managers to boast, that steam was issuing from the top of their furnace, while cast iron was being tapped from the bottom; but under such management we never hear of long campaigns; but very frequently hear of disasters.

It is thus seen that a brick which is good for the cupola would be worthless for the reverberatory furnace; that which answers well for iron, would generally be worthless for zinc, and a crucible which is excellent for steel cannot be used for brass. It is the way to realize progress to keep analyzing natural substances until we find the right one, or make repeated trials and depend upon them alone. All investigations go to show that we should look for artificial, and not for natural compounds; and that when we have made a mixture which has stood well, we are then to analyze and examine it in order to reproduce it. Failure in this, as in many other cases, is very often owing to wrong application of good materials, rather than fault in the materials themselves.

It is evident that no real progress can ever be made by any haphazard investigation. Chemical examination is, to a certain extent, a guide; but taken alone, it does not lead to any certain conclusion, for materials which on mere chemical analysis have been theoretically declared worthless, have, in actual practice, on account of some physical peculiarity which escaped observation, been shown to be of great value. Besides, a substance of no value alone may, in a mixture, be an almost indispensable article. To the analysis must be added the assay, and when these have both been carefully made, the commercial trial. After this has been done, there should be a complete chemical, microscopical, and physical examination of the substance, to determine what physical or mechanical changes have taken place, or whether it has, or has not, undergone deterioration. Only the general outline of such an investigation could be traced beforehand, and probably no one company would be justified in bearing the whole expense of it, but there is no doubt that if wisely planned and carried out, it would save millions of dollars every year to the iron and steel industries alone.

MINING NOTES FROM CALIFORNIA, COLORADO, GEORGIA, AND UTAH.

CALIFORNIA.—*French Corral Tunnel.—Nevada City News*, Aug. 9th.—This company has commenced washing through their tunnel. The sluice is 3,500 feet from the mouth of the tunnel to the shaft through which the gravel and water pass into it below. The sluice is five feet in the clear on the inside, with a grade of 8 inches to 14 feet—sides 34 inches high. The first 1,000 feet is lined up with blocks 12 inches thick, and the remainder is lined with rock of an average depth of 14 inches. The rocked portion, it is supposed by the managers of the company, will last for twelve months, and need but little, if any, repairing during that time. The blocks will have to be replaced much more frequently. The reason for blocking the upper section is for the convenience of cleaning up, which is done usually once in thirty days. This improvement is intended to work to the bedrock all the rich deposit of gravel that is owned by the company at that place, covering the whole channel of the old riverbed for a distance of 3,000 feet, and of an average width of 1,000 feet. A portion of the top of this deposit has been washed off, leaving the rich bottom of blue gravel to be washed through this tunnel. There has been a cement mill crushing a portion of the rich deposit for the past four years, yielding the owners a handsome dividend from the milling process, frequently paying $300 per day (24 hours). This was a 15 stamp mil, screens used, one-quarter of an inch in diameter, through which it was usual to put through about 125 to 130 car-loads per day, estimating two car-loads to the ton. Calculating the gross expense of labor, water, wear and tear, to average about $60 for each 24 hours run of the mill. Now that the tunnel is completed to this rich gravel deposit, and washing having commenced on the 31st of July, it is but reasonable to suppose that with the present improvements and appliances, that a rich harvest is in store for the company who have expended nearly $175,000 in driving through hard bed-rock for such a distance, occupying over four years in its construction, with one of the finest sluices in that section of the country. It having only run, up to this writing, four days, of ten hours each, it is surprising the amount of work done in such a short space of time. Under-currents will be established as rapidly as possible, from the mouth of the tunnel to the South Yuba River, a distance of nearly half a mile, and with a perpendicular fall of 400 feet. The company expect to get not less than twelve under-currents of the latest and most improved style, averaging in width from 20 to 30 feet, and length not to exceed 56 feet. These will be lined up with riffes made of 1¼ x 4 inch lumber placed on edge, and the top surface lined with ⅜ x 1¾ iron, this being supposed by many good miners to be the very best riffle for saving the precious metal and quicksilver. This is one amongst the most stupendous works and improvements of the kind in the State, the tunnel having been run eight feet on the bottom and eight feet high. From the mouth to the first angle, a distance of 2,400 feet, the tunnel is so straight that a rifle ball could be shot from the angle, striking the center at the mouth. With the sluice completed, a man has no difficulty in walking upright nearly the whole length of the same The company is using through this sluice 1,600 inches of water, carrying rocks that would surprise some of the oldest and most experienced miners in the vicinity.

The Red Rock Coal Mining Company, in Chalome Valley, California, recently struck good bituminous coal in a stratum which is said to be over 20 feet thick. The coal resembles the bituminous coal of Newcastle and the splint coal of Scotland. This coal field lies on the line of the railroad survey, between Hollister and Goshen.

Bituminous Coal Discovery in Oregon.—There has been discovered a mine of excellent bituminous coal on the middle fork of the Coquille river, Oregon, about fourteen miles above tide-water. One vein is reported to be seventeen feet thick.

A Copper Ledge has been discovered near Greggsville, in Gold Run District, Nev., which is said to be 25 feet wide. The ore is principally red oxide, of which there is a large quantity in sight on the surface. The location is about 17 miles from the railroad, Gonconda station being the nearest point.

COLORADO.—*Consolidation of Mines.—Colorado Miner*, August 12. The following mines located on Brown Mountain, have consolidated under one management: *The Silver Ore, Gunboat, Old Missouri, Mammoth, Glasgow, Brown, U. S. Coin*, and 43-ccc feet of outlying property, among which are the *Benton, Tycoon, Last Chance*, and other lodes; together with the *Union* and *Silver Ore* tunnels. The mines named are now all being profitably worked; but this consolidation will permit the property to be put in such shape that it can be operated much more successfully and on a larger scale than ever.

On the *Brown Mine* there are now forty-one men employed. The last mill run of ore taken from this mine, ran 533 ounces silver per ton, and sixty-three per cent. lead. The Brown, up to the time it was shut down in 1871, produced ore to the value of $380,000. Since that time considerable has been taken out, but we cannot get at the exact amount. A contract has been let to drive the Silver Ore Tunnel a distance of 300 feet (from its present intersection with the Silver Ore Lode) to strike the Brown. Six men are employed on the work.

The Silver Ore Lode has produced, to date, in round numbers, $140,000. A contract has been let to drive the Union Tunnel (located below the Silver Ore Tunnel) 500 feet into Brown Mountain, to intersect the Silver Ore Lode. Ten men are employed, working three eight-hour shifts. It is intended by the owners in the consolidated property, to put at an early day engine, pump, and hoisting machinery upon the Silver Ore at the tunnel level.

The Bobtail Gold Mine.—Central City Register, Aug. 9th.—About 150 men are employed in this mine and the developments are of the most satisfactory character. There are a mile or two of drifts and tunnels on the vein including a large number of shafts, cross cuts, and other excavations. Where the main tunnel intersects the vein, the hoisting and pumping apparatus is located. A short distance to the right a straight shaft is being sunk to connect the lower levels. In many places the mineral vein is from three to twelve feet thick. In others it has disappeared altogether and the miners are exploring for it. From seven to ten teams are engaged hauling the product to the mill and smelting works. The gross yield of the mine is very large, but we are without accurate data on this point.

The Briggs Gold Mine.—The principal shaft on this vein, which is identical with the Gregory, has now reached the depth of 725 feet. For some time past the crevice has been pinched, but has recently opened out to the thickness of eight feet, and is constantly widening as the workmen go down. The vein of smelting, or first class of mineral in the bottom is now twenty inches wide worth at the works about $136 per ton The milling material, which is abundant, is yielding much better than any other class of ore yet found in the mine. All the prospects are of the most encouraging character. The tailings from the stamp mill are dressed on contract and the yield ranges from ten to twenty-five dollars per ton, according to the quality of the ore reduced. The process of concentration is cheap, simple and efficient, and the dressed material is as clear of impurities as it is possible to make it. The product averages five tons per day. An average of 80 tons of rock per day is raised from the mine.

GEORGIA.—*The Findley Gold Mine.—Mountain Signa'*, Dahlonega, August 11th.—A 24 stamp mill is running to its fullest capacity day and night on a very fine quality of ore from this mine. The immense cave of slate and waste matter is finally removed, and the mine is now in splendid order, perfectly secure against a similar casualty. The masses of ore uncovered and in sight are very large. The lowest estimate places the amount sufficient to keep the mill running at the rate of one hundred tons a day (which is its utmost capacity) for twelve months. Besides the ore in this part of the mine, arrangements are about completed to get ore from the "Big Sand Vein," a vein from 25 to 30 feet in width. The tunnel to the Findley vein on this property is also completed. This tunnel was commenced in 1858 to strike the vein about 200 feet below the surface, and had to be abandoned in consequence of foul air and numerous other obstacles, and was resumed several times at remote periods but not completed until the property fell into the hands of the present proprietors. The tunnel is between four and five hundred feet in length, and its opening and connection with the Findley shaft admits a free current of fresh air, and renders work in the shaft perfectly safe. This was run down upon as far as it could be on account of foul air. More than one hundred thousand dollars was taken out of this shaft when it was abandoned.

The Hand and Benning Gold Mines are working on the same veins and both producing ore in paying quantities.

The Battle Branch Gold Mine is being developed by a tunnel which will strike the vein at about 250 feet below the surface, and give them a stope of about 100 feet. A small lot of selected ore from this vein in a rude little mill recently paid at the rate of $20,000 to the ton.

At the *Sprague Mine*, the *Lawrence Mine* and the *Jones Vein* the output and the indications are of the most encouraging nature.

UTAH.—*The Walker and Webster Mine* is situated in Uintah District, about three miles south of Park City. It has a total of over 2,000 feet of excavations, and has shipped about 1 800 tons of ore that averaged 28 oz. silver and 35 per cent. lead. There are now engaged on the mine five men, who extract some four or five tons of

such ore daily. The quantity of ore that is available is practically inexhaustible, there being in sight tens of thousands of tons that will average from 15 to 20 per cent. of lead, and 18 oz. of silver. This material can be mined at a cost of not more than 50 cents per ton; but the mine being so situated that to reach it by wagons is difficult, and the distance to reduction works considerable, the ore is, therefore, at present, practically valueless.—*Weekly Miner*, Aug. 8.

PRIZE ESSAY ON PURIFICATION OF GAS.—The German Gasmakers' Association offer £80 for the best treatise on the method of separation of carbonic acid from the lighting gas made from common coal. The method proposed must be set out at full length, with scientific explanation of its mode of action and description of apparatus for its use on an economical working scale. Essays are to be sent in unsigned, but containing a private mark, to Dr. SCHILLING at Munich, before December 31st next.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Aug. 12.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co	44,008	1,062,234	64,126	1,963,932
D. L. and W. RR. Co.	41,631	840,877	65,729	1,924,018
Penn. Coal Co	16,687	558,782	30,773	827,911
L. V. RR. Co.	25,694	544,934	21,583	548,201
P. and N. Y. RR. Co.	673	14,676	994	69,450
C. RR. of N. J.	14,200	680,950	47,667	574,534
Penn. Canal	20,897	211,429	18,314	97,591
	163,790	3,913,882	249,186	5,985,697
Lehigh Region.				
L. V. RR. Co	107,436	1,448,283	85,398	651,381
C. RR. of N. J.	41,729	704,038	38,040	213,285
D. H. and W. B. RR.	601	26,332	1,154	45,527
	152,766	2,178,653	124,592	910,193
Schuylkill Region.				
P. and R. R. RR. Co.	93,750	2,391,109	179,603	1,883,163
Shamokin & Lykens Val.	—	472,409	33,698	736,092
	93,750	2,863,518	212,701	2,624,255
Sullivan Region.				
Sul. and Erie RR. Co.	165	26,805	—	5,557
Total	410,471	8,982,858	586,479	9,525,702
Increase	—	—	—	—
Decrease	176,008	542,844	—	—

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

Perth Amboy business: Tons.

Received for the week	19,194
Shipped for the week	18,059
On hand Aug. 12	70,287

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 349,390 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR, report.

	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	12,122	157,018	47,036
" " " South Amboy	11,697	260,322	80,014
Shipments at Coal Port (Trenton)	7,172	144,870	44,480
" South Amboy	11,669	278,186	135,018

Receipts of Coal at Boston, for week ending Aug. 11, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	2,630	81,158	102,463
Philadelphia	11,441	604,712	475,177
Baltimore	1,933	136,822	165,587
Other places	4,915	280,775	244,887
Great Britain	—	4,722	2,224
Nova Scotia	—	22,616	27,323

Coal Shipped at Pictou, N. S., for week ending Aug. 12, 1876 ..... 7,875 tons.
Previously exported ..... 86,743 "
Total to date 94,618

The Production of Bituminous Coal for the week ending Aug. 12, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md.		
Tons of 2,240 lb	39,269	1,047,245
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	7,231	199,721
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3,161	98,302
*East Broad Top	983	43,314
Clearfield Region, Pa.		
*Snow Shoe	885	33,007
*Tyrone and Clearfield	25,251	691,350
Allegheny Region, Pa.		
*Pennsylvania RR	3,932	127,206
Pittsburgh Region, Pa.		
*West Penn. RR	3,757	121,705
*Southwest Penn. RR	1,045	36,378
*Penn. & Westmoreland gas coal, Pa. RR.	14,213	468,197
*Pennsylvania RR	798	162,842

* For the week ending Aug. 7.

The Production of Coke for the week ending Aug. 7.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
West Penn. RR	620	28,559
Southwest Penn. RR	9,108	304,756
Penn. & Westmoreland Region, Penn. RR.	1,334	28,992
Pittsburgh, Penn. RR.	1,905	106,152
Total	12,967	468,459

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Aug. 18, 1876.

Anthracite.

THERE is no change to note in the demand for anthracite coal. There is but little inquiry, and that which does exist is entirely of a hand-to-mouth nature. There is nothing at present to indicate that a much better business will rule later in the year.

Further trouble is certainly looming up for the Combination, and about all that can be said for that organization is that it bears a name. For weeks we have been chronicling transactions on the part of first one member and then another, which, had the Combination possessed much strength, would not have been permitted for a day. The present trouble comes from an old offender—the Lehigh Valley R. R. Co. In our number of July 22 we noted that the Company had "exceeded its proportion of shipments to competitive points by 80,000 tons," and that the Combination had resolved, "that unless this excess be extinguished before the end of August, the several companies in the Combination shall then be relieved from all further obligation to observe the terms of the programme." In our number of July 29 we estimated that at that time the excess of this Company had reached fully 150,000 tons. We also announced in the same number that the Lehigh and Wyoming operators had resolved to suspend production for two weeks in August, that their excess of shipments to competitive points might be extinguished. And we expressed the opinion that the proposed cause was not adequate to produce the predicted effect. Judging from present indications, by the end of August the excess of this Company will have reached fully 250,000 tons. This is supposed to be an "off week," or one in which production was to have been totally suspended on the line of the Lehigh Valley R. R, but instead of such being the case, some of the mines are shipping to their utmost capacity; the Lehigh Valley R. R. Co.'s own mines among those at work. This shows but little respect for the Combination on the part of this Company. It cannot be predicted even from this that the Combination will be broken up, but matters are certainly assuming a very serious aspect, and its existence is in imminent danger.

Bituminous.

The demand for this coal is very similar to what it has been for several weeks past, with no encouraging prospects ahead. Shipments, however, especially from the Cumberland Region are showing a falling off owing to an exhaustion of orders. The loss in shipments from this region last week, as compared with the corresponding week last year was 13,151 tons, and the total loss since January 1, as compared with the like period of 1875, was 343,734 tons.

Evidence is being taken in the case of the American Coal Company vs. the Consolidation Coal Company, to enforce the rates of freight according to the amended law. A decision in the case of the State of Maryland vs. the Consolidation Coal Company, in demurrer, is anticipated at a very early day.

The movement to construct an additional railroad to the Cumberland mines is gaining favor each day, and should the causes now pending against the Consolidation Company, be decided unfavorably to the mining companies, it is highly probable that the road will be built.

Messrs. PERKINS & JOB, are receiving considerable encouragement in their efforts to introduce Cannelton spint coal at "popular prices" for domestic uses. The price ($7.50) at which they are offering this coal, is not only attracting the attention of those who formerly used English coal, but also some who have heretofore used only anthracite.

It has been reported that all the Youghiogheny mines have ceased shipments, and that there is none of this coal being shipped from Baltimore. We are informed by correspondence that the Waverly Company's mines, at least, are shipping their usual quantity, although a strike is in progress at several other mines, and numerous outrages have occurred.

Coal Trade of Philadelphia.

PHILADELPHIA, August 17, 1876.

Things are in a terrible condition in the Schuylkill Region. The time is approaching when there will be a much better demand for domestic sizes, and the season advancing, so that many of the contracts for large sizes cannot possibly be shipped, and the supply of light cars keeps decreasing steadily. It is down to 20 per cent. now. Operators complain that not only they cannot fill their orders, but that working at such a reduced proportion of their capacity, cannot be done except at great loss. To relieve them the following circular has just been issued:

(Circular No. 8.)

PHILADELPHIA AND READING RAILROAD COMPANY,
GENERAL OFFICE, 227 SOUTH FOURTH STREET,
PHILADELPHIA, August 16th, 1876.

Hereafter, when any operator desires to suspend mining coal one week out of every two, a double proportion of cars will be furnished him during the week that his colliery is in operation.

The above will apply only in cases where operators voluntarily suspend mining for the purpose of utilizing two weeks' supply of cars in one week.

FRANKLIN B. GOWEN, President.

Freights to the East remain $1.05@$1.10 to Rhode Island; $1.15 to Boston. To the South rates are higher—75c. to Washington, 70c. to Richmond, and 60c. to Norfolk.

* ***Wholesale Prices of Anthracite Coal for Aug., f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.***

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	4 90	5 00	5 10	5 20	5 80	5 10
Pittston at Newburg	4 75	4 85	4 95	5 05	5 65	4 95
Wilkesbarre at Port Johnston	4 90	5 00	5 10	5 20	5 80	5 00
Plymouth, R. A.	....	....	5 10	5 30	5 90	5 10
Susque. Coal Co. at Amboy W.A.	4 90	5 00	5 10	5 20	5 80	5 00
Kingston at Hoboken	4 90	5 00	5 10	5 20	5 80	5 00
Lehigh Coals.						
Old Company at Port Johnston	5 40	....	5 2	5 22	5 80	5 10
Old Company's Room Run "	5 40	....	5 20	5 20	5 80	5 10
Sugar Loaf, Hobok. & Amb. "	5 40	....	5 20	5 20	5 80	5 10
Lehigh Coal Exchange "	5 40	....	5 20	5 20	5 80	5 10
Honey Brook Lehigh	5 40	....	5 20	5 20	5 80	5 10
Beaver Meadow at South Amboy	5 40	....	5 20	5 20	5 80	5 10
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	4 90	5 00	5 10	5 20	5 80	5 00
Schuylkill red ash	....	....	....	5 30	5 90	5 00
Shamokin white and red ash	....	....	....	5 40	5 90	5 00
Lorberry	....	....	6 00	6 00	6 00	5 05
Lykens Valley	....	....	6 45	6 45	6 45	5 50

* Contractor's prices are 20c. per ton less.

†The prices of Schuylkill coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	40c.
" " Elizabethport & Port Johnston to N. York.	40c.
" " South Amboy to New York	35c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c.

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$5 70	$6 00	$5 30
Lackawanna coal, in yard	5 70	6 00	5 30
Wilkes-Barre, delivered	6 25	6 75	5 75
Lehigh & Locust Mountain, del'd	7 00	7 00	6 00
Schuylkill Red Ash, del'd	7 50	7 50	6 00

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " "	.... 22 00
American " " " "	.... 13 00
Cannelton splint, " " "	.... 7 50
Cannelton Block, " " "	.... 7 50
American Orrel " " "	....11@14
Red Bank Cannel " " "	..... 14 00
Cumberland " " "	..... 7 00

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt.	4 25	5 75
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 35	6 00
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.	....	10 00
" Splint, " at Richmond.	4 50	6 00
" Gas Coal at Richmond.	4 00	5 50
Peytona Cannel, W. Va. at Richmond	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va.	3 50@3 75
Cumberland, at Baltimore	3 65@3 80
Clearfield f.o.b. Canton, Baltimore	3 75@....

4 90
5 10
5 25

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., 95, f. o. b. Greenwich, Philadelphia, per 2240 lb., $3 60@3 95, according to destination; at South Amboy, N.J., 4 60; New York, 5 00.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 95; at Greenwich, Phil., per 2240 lb., 3 75@4 25, according to destination; f.o.b. South Amboy, N. J., 4 75; New York, 5 25.

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	...
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou	2 25	5 75

Baltimore, Md. Aug. 15, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 87	$4 72
Broken	5 25	5 10
Egg	5 35	5 20
Stove	5 76	5 61
Nut	4 91	4 76
Shamokin, (red or white ash), and "Boston," free burning white ash,		
Egg	5 35	5 20
Stove	5 75	5 60
Lykens Valley, red ash,		
Egg and stove	6 30	5 73

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. .....$3 50@8 00

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Boston. Aug. 12, 1876.

COAL is very unsettled, the cutthroat competition among retailers giving irregularity to all transactions. Some dealers have sold stove coal this week at $6 25 per ton, egg at $6, and broken at $5 50, though most of the retail sales have been at $6 75, $6 25, and $6; while the nominal retail price is $7 50 for stove. The break has not stimulated sales to any great extent.

The trouble seems to have originated in one or two of the dealers cutting under on large lots. Batchelder, the agent of the Philadelphia and Reading, and Winslow, agent of the Lackawanna, then advertised a reduction at once to the lowest possible point for small as well as large lots, and the whole trade of course had to follow suit. Yesterday it was reported on the street that these agents had received notice by telegraph from their respective companies to advance. Partly as a result, a circular was issued to retail dealers calling for a meeting to advance prices, and it is altogether probable that the present demoralization will not continue next week.

As to the stories about the Combination itself cutting under on prices, which are traceable to the bearish party in coal stocks on the New York Exchange, they seem to have originated in the fact that the Combination have been guaranteeing freight rates considerably under the market, this virtually lowering prices. Freights are flat at $1 15 from Philadelphia. There is a good deal of coal coming forward in the aggregate. A meeting of the Combination has been called to consider differences among themselves.—*Commercial Bulletin.*

Buffalo, N. Y. Aug. 15, 1876.

Reported by LEE & LOOMIS.

Deliv'red at	Elmira. Afloat.	Ithaca. Afloat.	Syracuse. Afloat.	Rochester. Afloat	Rochester. ret. del.	Oswego f.o.b.
Grate	$4 05	$4 35	$4 50	$5 20	$6 45	$5 45
Egg	4 05	4 35	4 50	5 20	6 45	5 45
Stove	4 45	4 80	4 95	5 65	6 90	5 90
Nut	4 15	4 50	4 65	5 35	6 60	5 60

Delivered at	Erie. f.o.b.	Buffalo. Afloat.	Buffalo. f.o.b.	Buffalo. ret. del.
Grate	$5 95	$5 45	$5 95	$6 70
Egg	5 95	5 45	5 95	6 70
Stove	6 40	5 90	6 40	7 15
Nut	6 10	5 60	6 10	6 80

Chicago, Ill. Aug. 15, 1876.

No change in prices of coal. Trade quiet.

Cincinnati, O. Aug. 8, 1876.

Reported by our Special Correspondent.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7½@8c.	—
Pomeroy coal "	5 @5½c.	—
Kanawha " "	7 c.	—
Cannel coal, according to quality "	10 @16c.	—
The following are the retail prices delivered		
Youghiogheny	10c.	—
Pomeroy	8c.	—
Cannel	15@22c.	—
Kanawha Semi-Cannel	10c.	—
Anthracite, per ton	10 50@11 00	
Coke, at yard	7c.	—
Coke, hard and soft, delivered	9@10c.	—

Cleveland, O. Aug. 15, 1876.

Specially reported by Messrs. BATES & MARTIN.

Herewith find quotations of our market:

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 10	$4 00
Cannel	4 25	4 15
Blossburgh	$5 00	$5 00
Briar Hill, Block Coal	3 50	3 25
Straitsville Coal Co., lower vein	3 00	2 90
" " whole "	2 90	2 80
Hocking Valley	2 90	2 90
Massillon	3 00	3 00
Tuscarawas Valley	2 65	2 60
Columbiana	2 65	2 60

Office of CLEVELAND COAL EXCHANGE,
89 Seneca Street, June 3d, 1876.

PRICES TILL FURTHER NOTICE.

	1 to 10 tons.	10 tons upw'd.
Massillon, Brier Hill and Mineral Ridge, lump.	$4 50	$4 25
" " " " " nut	4 00	3 75
Straitsville Lower Vein, Hocking & Shawnee, l'p.	4 00	3 75
" " " " nut	3 50	3 25
Del Carbo and Rich Hill, lump	3 75	3 50
" " " nut	3 25	3 00
Maple Hill, lump	3 50	3 25
" " nut	3 25	3 00
Columbiana, lump	3 25	3 00
nut	2 75	2 50
Lackawanna and Wilkesbarre, egg and grate	7 50	7 30
" " stove	8 00	7 75
" " chestnut	7 75	7 50

No Anthracite coal to be sold for future delivery except it be subject to Exchange price at time of delivery.

H. E. CHUBB, Secretary.

Indianapolis, Ind. Aug. 15, 1876.

Specially reported by Messrs. COBB & BRANHAM.

Wholesale on board cars, and retail delivered to consumers.

Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton.	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car.	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use.	12	Youghiogheny	20
Highland Nut, " "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE,

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton,
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Aug. 15, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Please report our prices as follows:

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c.	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	20c.
Pine Hill	13c.	City-made Coke	10c.
Kentucky	10c.	Anth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load			$3 00
Screened Raymond City			2 75
Pine Hill (Kentucky)			2 75
Cannel			$5 to 5 50

Milwaukee, Wis. Aug. 15, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Trade is quiet. Our prices for coal are:

Retail price per ton of 2000 lb.

Lehigh Lump	$9 00	Briar Hill, select	$7 00
Lehigh Prepared	9 50	Blossburgh	7 00
Lackawanna (all sizes)	8 50	Cannel	8 00
Pittston	8 50	Pittsburgh	6 50
Scranton	8 50	Steam coal	5 50

New Orleans, La. Aug. 15, 1876.

Reported by C. A. MILTEBERGER & Co.

Pittsburgh coal, retail, per bbl	50c
" wholesale	30c
" steamboats, per box	40c.
" to manufacturers	45c.
" shipments, per hhd	$5 25
Anthracite, wholesale, per ton	...
" retail, "	12 50
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	...
" " retail, "	50c.
St. Bernard wholesale, per bbl	30c.
" retail, "	45c.

Richmond, Va. Aug. 15, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Prices are now as follows:

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 00
" semi-Cannel	4 00	Clover Hill Coal	3 50
Coalburgh Splint	4 00	James River Bitum	3 30
Lewiston "	4 00	" " Carbonite,	5 00
Kanawha Gas coal	3 90		

San Francisco, Cal.

From the *Commercial Herald*, Aug. 10, 1876.

Imports from Jan. 1st to Aug. 1st:

	tons.		tons.
Anthracite	8,929	Vancouver Island	59,663
Australian	49,159	Rocky Mountain	132
Coos Bay	22,749	Seattle	58,999
Cumberland	5,877	Bellingham Bay	14,070
English	16,087	Chili	2,076
Mt. Diablo	65,590		

The arrivals since our last weekly reference embrace the following cargoes: *City of Ningpo*, 1,247 tons Sydney; *Mitredale*, Newcastle, N S. W., 1,731 tons; *Ardear* from the same with 1,256 tons; *Adolph*, Sydney, 810 tons; *S. M. Stetson*, 1,214 tons, Newcastle, N. S. W.; *Olive*, 1,200 tons from the same; *Osmeyn*, 830 tons, Seattle; *Blenheim*, 780 tons, Newcastle, N. S. W.; *City of Panama*, 900 tons, Nanaimo. This latter being of superior quality Steam is largely purchased by the Pacific Mail Steamship Company and may now be quoted at $8. The Central Pacific Railroad has a contract with the Seattle Company at $9. The *Black Eagle* from Nanaimo, B. C. brought 2,100 tons. The *Amethyst* from Bellingham Bay 500 tons. Supplies from Coos Bay are steadily accumulating here. The Cumberland, ex *Palmyra*, which sold last week at auction at $13.37½@13.62½ has since been resold at a small advance. As before published, English Steam to arrive next Autumn has been sold as low as $7@7.50. California (Mt. Diablo), is held at $5.75 for screenings, $7.75 for coarse; Australian, $8@8.50, latter for Wallsend; Coos Bay, Vancouver, Bellingham Bay, Seattle, etc. $8@9; Anthracite, $12@14; Cumberland, $14@16—all for spot parcels. From late Australian advices we learn that from June 1st to 24th 22,800 tons of Sydney Coal had been dispatched to this port, leaving some ten or more vessels at Newcastle yet to load. The steamer *Constitution* for Panama 9 inst., takes part cargo Coal Br. ship *Bedfordshire* from Australia—say 800 tons cargoes of Australian to arrive have been sold at $7.75, and spot lots of West Hartley, $11.25. The latest arrivals are the *Conflict* and *Firth of Clyde*, from Newcastle, N. S. W. with 1,414 and 1,225 tons respectively.

Montreal. Aug. 14, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$4 25	Cape Breton Steam	$3 75
Pictou "	4 25	Newcastle Smiths	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 25	Chestnut	6 25
Stove	6 75		

Toronto, Ont. Aug. 14, 1876.

Chestnut	$7 25
Stove	7 50
Egg and grate	7 25
Bituminous coal for domestic use	6 00
" " steam	3 50@5 50
Lehigh Lump and broken	7 50
Blossburgh	6 50

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	2 42	2 28	2 84	2 75	2 98
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	70
‡ Philipsburg, N. J., (46 miles)	91	77	1 33	1 24	1 47
Elizabethp't, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	2 06	1 92	2 48	2 39	2 62
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72
Elizabeth, Cranford, Westfield & Elizabethport, for consumption, Jersey City, N. J., (121 miles) and New York, via L. V. RR.	2 42	2 28	2 75	2 75	2 98
Andover, via Delaware, Lackawanna and Western RR.	2 42	2 28	2 84	2 75	2 58
§ Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division	3 30	3 10	3 70	3 69	3 99
Trenton, (97 m.) for shipment, including shipping and wharfage	2 65	2 45	3 05	3 04	3 34
	2 11	1 95	2 45	2 46	2 76

From *Mauch Chunk* to *New York* (121 miles). (towing limits) and Jersey City† via Lehigh Valley RR. $2 14

From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR 1 75

††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware, Lackawanna and Western RR., Morris and Essex Division 1 10

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one

party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

The distances in the above table are Computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles and from *Mauch Chunk* it amounts to 106 miles.

Freights.

Representing the latest actual charters up to Aug. 17, 1876.
Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	1 90	....	....
Albany	†80	1 50	....	....
Alexandria	....	65	....	....
Amesbury, Mass	....	....	....	....
Bangor, Me.	....	1 50	....	90
Bath, Me	1 10@1 15	1 40	1 40	90
Baltimore	..	....	....	....
Boston, Mass	1 15@1 20	1 40	145-50	90
Bridgeport, Ct	†1 00	1 30	....	55
Bristol, R. I.	....	....	....	80
Cambridgeport, Mass.	§1 20@1 30	....	...	90
Derby.	....	....	....	....
Dighton.	....	....	....	....
East Cambridge	§1 15@1 25	....	....	$90
Fall River	1 15	1 40	1 35	80
Hackensack	*70	....	....	....
Hallowell, Me.	....	....	....	....
Hartford	*70	1 90	1 65	90
Hoboken	†70	1 25	1 15	40
Hudson	....	1 40	1 40	....
Jersey City	70	....	1 15	40
Lynn, Mass	....	..	....	† 90
Middletown	....	....	....	80
Mystic	....	....	....	....
Newark	71	1 40	1 30	....
New Bedford	1 15	1 45	1 25	80
Newburyport	1 25	1 55	1 50	1 00
New Haven	1 00	1 30	1 30	55
New London	1 20	1 40	1 35	65
Newport	1 10@1 20	1 45	....	80
New York	70†	1 30	1 25	40
Norfolk	....	60	....	....
Norwalk	1 00	1 40	....	60
Norwich	1 20‡	1 45	1 40	70
Pawtucket	1 25‡	1 50	....	....
Philadelphia	....	75	....	....
Portland.	1 15	1 35	1 40	90
Portsmouth, N. H.	1 15@1 20	1 50	1 60	1 00
Providence	1 10@1 15	1 40	1 35	80
Poughkeepsie, N. Y.	....	....	....	....
Rockport.	....	....	.	....
Saco	....	....	1 80	....
Sag Harbor.	....	1 40	....	1 00
Salem, Mass	§ 10@1 15	1 45	1 50	90
Salisbury Pt., Mass.	....	....	....	...
Stamford	....	....	....	60
Stonington	....	....	....	80
Taunton	....	..	....	...
Troy	†80	1 50	....	..
Warren, R. I.	....	....	....	80
Wareham	....	1 45	1 50	....
Washington	....	65	....	....
Weymouth	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles), the legal charge is 2 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $4 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 75 cents per net ton.

From Cumberland to Baltimore (178 miles) $2.02 per ton of 2240 lb., or $1.80 per net ton (¼ cent per ton per mile for use of hoppers over C. & P. RR.).

From Cumberland to Georgetown (152 miles) by canal, $1.10. Tolls, 46 cents.

From the Mines to Piedmont, 4 cents per ton of 2240 lb. per mile on distances less than 4 miles, and 3 cents per ton per mile on distances over 4 miles, and 2 cents per ton per mile on distances over 10 miles.

From Piedmont to Baltimore (206 miles) $2.34 per ton of 2240 lb., or $2.08 per net ton.

From Osceola to Greenwich, Phila. (say 248 miles) per T. & C RR, per ton bituminous coal of 2000 lb., less drawback of $1.46. $2.15; rate per gross ton, $2.60.

From Osceola to South Amboy, N.J., (317 miles) per 2000 lb., $4.03, less drawback, $1.03; rate per net ton, $3; add 12 per cent. for gross ton, 36 cents, terminal expenses, shipping, 20 cents; rate per gross ton, $3.56.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Aug. 18, 1876.

American Pig.—There are no transactions taking place worthy of note. Buyers only make purchases as they require iron, and as they only take small lots market prices are generally secured. The condition of the market is such that if a large block were forced upon it, it would have to be sold at a considerable concession. It is very difficult to say what prices are likely to rule during the balance of the year, but it is very evident that they will not advance. We quote No. 1 foundry at $22; No. 2, $20; and forge $19@$20.

Scotch Pig.—This article is even more quiet than American pig. The arrivals are small yet they appear to be in excess of the present requirements of the trade. We continue to quote Eglinton at $27; Gleng rnock, $28@$28.50; and Coltness, $29@$29.50.

Rails.—Without business we quote iron rails at mills nominally at $38@$41, and steel at $56@$61.

Old Rails.—There have been no further transactions in these. We quote at $21.50@$22.

Scrap.—This article is very quiet, with No. 1 wrought quoted at $28 from yard.

Baltimore. Aug. 16, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

We have no change to report in the iron market. Business continues very dull and sales light, at about quotations:

Baltimore Charcoal	$30@35	Anthracite No. 1	$20@21 00
Virginia Charcoal	28@34	Mottled and White	17@19 00
Anthracite No. 1	23@24	Charcoal C B. Blooms	65@57 00
" No. 2	22@23	Refined Blooms	50@55

Chattanooga, Tenn. Aug. 15, 1876.

Specially reported by J. F. JAMES pig iron broker, etc., 233 Market Street.

There is no change to note in the condition of our market since last report. Stocks continue very light, indeed; there is an entire absence of some grades. An improvement in prices is expected by our Southern furnacemen.

The usual four months time is given on quotations below:

Tenn. Ala. and Ga. Charcoal, No. 1 foundry		$21@ 22
" " " " No. 2 foundry		20@ 21
" " " " gray forge		17@ 18
" and Georgia coke, No. 1 foundry		18@ 19
" " " No. 2 foundry		17@ 18
" " " " gray forge		15@ 16
White and Mottled		14@ —
Tennessee and Georgia cold-blast car wheel		23@ 24
Alabama " "		23@ 24
Old Rails	cash	22 00
Cast Scrap		" 12
Wrought Scrap		" 18@ 20

Cincinnati. Aug. 15, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Some of our furnacemen have taken their product out of the market, not willing to accept the ruling low prices any longer. We quote:

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 00@25 00	—4 mos	
" No 2, "	23 00@	—4 mos	
" Mill	20 00@21 00	—4 mos	
Tennessee, No. 1, Foundry	23 00@	—4 mos	
Tennessee, No. 2, "	22 00@	—4 mos	
" Mill	20 00@	—4 mos	
Missouri, No. 1, Foundry	@	—4 mos	

STONE COAL.

Ohio, No. 1, Foundry	22 00@22 50	—4 mos
" No. 2, "	20 50@21 00	—4 mos
Ohio Mill	19 00@19 50	—4 mos
Missouri, No. 1 Foundry	25 00@	—4 mos
" No. 2, "	24 00@	—4 mos
" Mill	23 00@	—4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	—4 mos
Tennessee "	26 00@32 00	—4 mos
Missouri "	32 00@35 00	—4 mos
Alabama "	26 00@32 00	—4 mos

BLOOMS.

Charcoal	60 00@ 75 00—cash

SCRAP IRON.

Cast	50c.@ 85—cash
Wrought	1 00@1 40—cash

Cleveland, Ohio. Aug. 15, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00@....
No. 2, " "	26 00@....
No. 1, Anthracite	25 00@....
No 2, "	23 00@....
No. 1, Bituminous	25 00@ ...
No. 2, "	23 00@....
American Scotch, No. 1, Cherry Valley	.... @....
" " B—1, " "	@....
" " No. 2, " "	.... @....
No. 1, Massillon	26 00@....
B—1, "	24 00@....
No. 2, "	22 00@....

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 50@....
No. 4 " " "	27 50@....
Nos. 5 and 6 "	27 00@....

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	27 00@....

FORGE IRON.

No. 1, Gray	22 00@....
White and Mottled	20 00@....

Louisville. Aug. 15, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

There is a better feeling in iron, and sales are more frequent. There is not so much disposition to press sales, and several brands that have changed hands at very low prices, on account of forced sales, are now held higher, and are selling at the advance. On other brands there has been no change in price. We make a partial revision of figures, based on actual sales.

The usual four months is given on quotations below:

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$23 00@25 00
No. 2 " " "	22 00@23 00
No. 1, Mill, from " "	20 00@21 00
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	21 00@22 00
No. 1, Mill, from " " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " " "	21 00@22 00
No. 1, Mill, " " " " "	19 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores	22 00@23 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " " "	19 00@21 00
No. 1 Foundry, from Missouri Ores	—— @ ——
No. 2 " " " "	—— @ ——
No. 1 Mill, from Missouri Ores	24 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@45 00
" " Tennessee "	28 00@30 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@45 00

Milwaukee. Aug. 15, 1876.

Iron remains much the same—sales small.

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No. 1		$28 00
" " " No. 2		27 00
" " " No. 3, 4 & 5		25 00
" " " No. 6		25 00
Mil. Anthracite L. S., No. 1		27 00
" " " No. 2		26 00
Wisconsin Iron, No. 1		26 00
Mahoning Valley Bit's No. 1		32 00
" " " No. 2		30 00

Richmond, Va. Aug. 14, 1876.

Reported by ASA SNYDER, Esq.

The iron market is as dull as ever. Demand light and prices unchanged.

Virginia Cold Blast Charcoal Pig Iron			$27 to $33
" Warm " "			24 to 28
" " " Coke	" "	1 X	23 to 24
" " " "	" "	2 X	21 to 22
" " " "	" "	3	20 to 21
" Anthracite	1 X		— to —
" "	2 X		— to —
"	3		— to —

San Francisco, Cal.

From the *Commercial Herald*, Aug. 10, 1876.

Late New York advices report an improvement in tin plate by reason of lessened productions and reduced imports. With us sales have recently been made of IC. Coke 10x14 and 14x20 at $7.50; IC. Charcoal, $8.50; Roofing Charcoal (Terne), 14x20 at $8.25. Sheet zinc may be quoted at 9¼@10c. Of pig iron our total receipts for the first seven months of the year were 10,823 tons against 15,562 tons same time in 1875. The present price is $30@31 for Scotch and other No. 1 brands. Eastern advices note a large falling off in the American production thus far during the year, owing to the very low prices ruling. The ship *Nightingale*, for New York, carries 531,054 lb. pig lead.

St. Louis. Aug. 16, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Mo. Stone Coal No. 1 Fy.	$25@26	Massillon Iron, A No 1	29@30
" " " 2 "	23@24	" " B "	1.31@—
" " Gray Mill, 22½@23		" " "	2.28@—
" Charcoal No. 1, Fy.	23@24	Cold Bl. Car Wheel, Mo.	30@33
" " " 2, "	22@23	" " " " Tenn.	30@33
" " Gray Mill,	22@23	" " " " Ala.	30@33
Tenn. " No. 1, Fdy	23@24	" " " " H. R.	33@35
" " " 2, "	22@23	Mo. Charcoal Blooms	50@65
" " Gray Mill	22@23	" Scrap "	45@55
Va. Coke, No. 1, Fdy.	24@25	" " hammered Billets	75@80
" " " 2, "	23@24	Assorted Bar Iron 2 50, 60 days	
" "Gray Mill,	21@23	No. 1 Wrought Scrap 90c. cwt.	
H. R. Char. No. 1, Fdy.	25@26	Heavy cast "	70 "
" " " 2, "	24@25	Light "	50
" " Gray Mill,	24@25		

Montreal. Aug. 8, 1876.

We continue to quote: Pig iron, Eglinton and Clyde, $18@19.00; Carnbroe $19.00@20 00; American $21@23; Summerlee and Calder $19@20; Langloan and Gartsherrie $20@21; Coltness $20.50@21.00; Hematite $26@27. Bar, per 100 lb., Scotch and Staffordshire, $2.00@2.15; best do., $2.30@2.35. Swedes and Norway $4.75@5.50; Low Moor and Bowling, $6.50@7.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Aug. 18, 1876.

THE week under review has been a very quiet one, the only feature to the market being a weakening tendency in one or two articles.

Gold Coin.—During the week under review, gold has ranged from 111⅛ to 110¾, and closed at 110¾.

Bullion.—Silver was sold in London, yesterday, at 53¼d., while the last quotation from there to-day was 51¼d. The London *Times*, in its financial article of to-day, says the announcement that the India Council, on next Wednesday, will receive tenders for bills amounting to fifty lacs of rupees (\$2,500,000) has unsettled the silver market, and there is scarcely any inquiry. Advices received from India and China say exchange is weaker, with a downward tendency. Our market closes at 112, while San Francisco still quotes at 15 per cent. discount. Gold bars are unchanged in prices at par to ¼ per cent. premium.

MESSRS. VIVIAN, YOUNGER & BOND, of London, under date of Aug. 3, say: "The recent oscillations in the price of silver, with the accompanying fluctuations in the course of the exchanges thereby affected, account for a great part of the adverse movement in the metal market for some weeks past. The fall in silver being now apparently arrested there is more confidence in the public mind, and though in some instances the demand will probably remain contracted for some time to come, holders of stocks now look for steadier prices, and the cheapness of money is inducing some buying for investment where values look tempting."

Copper.—The sales during the week aggregate from 300,000 to 400,000 lb., at 19¼c.@19¼c., closing at 19c. bid and 19¼c. asked. The only feature to this market appears to be a lack of demand and a desire to realize on the part of some holders. The latest London cables quoted Chili Bars at £70, and Best Selected at £77.

MESSRS. VIVIAN, YOUNGER & BOND say of copper:—"During the past month prices gave way about £4 per ton all round, making a decline since June 1st of upwards of £8 per ton. About the middle of the month Chili Bars touched £70, which proved the turning point and though the principal purchases of this description were made on speculation a fair quantity of manufactured (Indian sizes) was sold at £81 to £82, and the home trade took what they required in Tough and Best Selected at from £75 to £78.

"The Continental demand has been very moderate throughout, as for some time past, partly owing to the direct importations of Chili Produce to Havre (present stock 5,850 tons), and of 3,020 tons Lake Superior from America, with the prospect of further direct shipments from that quarter."

The quantity of Chili Bars, Ores and Regulus in stock at, and afloat for, Liverpool, Swansea, and Havre, and of English and Foreign Copper in London, is thus estimated in Fine Copper:—

	August 1, 1876.	August 1, 1875.	August 1, 1874.
Stock	24,976	22,653	27,864
Chili produce shipping & afloat per mail advices..	6,300	7,150	5,500
Total.....Tons.	31,276	29,803	33,364
	August. 1, 1876.	July 1, 1876.	June 1, 1876.
Stock	24,976	24,104	20,791
Chili produce shipping & afloat per mail advices..	6,300	6,850	8,700
Total.....Tons.	31,276	30,954	29,491
Chili produce chartered for per Cable advices received up to date.....	3,600	3,200	3,150
Australian produce...afloat.	1,300	afloat . 600	land'g 700 afloat. 1,100

Tin.—There has been but a very small business done in this article. The nominal quotations are—Straits, 16¾c.; L. & F., 16⅝c.@16⅞c.; and Banca, 20½c.—prices all gold.

MESSRS. VON DADELSZEN & NORTH, of London, under date of August 4, say of Tin: "The advance in price which took place on the publication of the statistics early in July gradually died away, and Straits declined from £75 10/ to £73; at this it stood until the result of the Dutch sale was known when £72 was accepted, it recovered next day to £73, and even £73 10/ was paid; our closing quotation is £73 in all positions for both Straits and Australian. The result of the Dutch sale was somewhat of a surprise, and is an evidence of the entire change which has come over the condition of the Dutch market, which, instead of being sustained artificially at a price far above ours, has been allowed to find its natural level, and tin in Holland is now as cheap, if not cheaper, than tin here. The arrivals here during July were 1,001 tons, and the delveries 895 tons, which include about 180 tons transhipped to America. The delivery of Banca in Holland was 420 tons and Billiton 310 tons, 6 tons coming to London. There is a considerable falling off in the London delivery compared with last month and last year, which may, perhaps, partly be attributed to the cessation of the removals of tin from stock here to Holland. There are still now, as we are credibly informed, 1,000 tons of Australian tin in "enforced idleness" in Holland, which do not appear in our general statistics, but which must ultimately find their way into consumption on the continent here. Telegraphic communication is still interrupted between England and the East, we must, therefore, to a certain extent, estimate the shipments for July, which we put as 600 tons from the Straits and 400 tons from Australia.

English tin has been in good demand and realized comparatively high prices; the present quotation for ingot is £78, bars £79, refined £80.

The quantity of tin here and in Holland and afloat on 1st August, 1876, was as follows, compared with the other dates named:

	July 1st, 1876.	Aug. 1st, 1876.	Aug. 1st, 1875.	Aug. 1st, 1874.
	Tons.	Tons.	Tons.	Tons.
Banca on Warrants	842	1,376	918	930
Arrived for next sales	1,836	1,294	2,432	3,970
Afloat " "	390	250	1,140	840
Billiton in Holland	1,155	920	890	930
Afloat	1,030	960	640	512
Foreign tin in London warehouse	6,388	6,642	5,400	2,057
Ditto not landed	653	505	166	344
Straits afloat, advised per mail and telegraph for Europe	900	950	900	750
Australian afloat	1,100	1,300	1,300	1,000
Total	14,294	14,197	13,786	11,333
Price of Straits	£75	£73 10s.	£77	£95 10s.

Tin Plates.—Under a very quiet business, tin plates are quoted as follows, gold, per box: Charcoal tins, \$7.25@\$7.37½, and ternes, \$6 75@\$7; coke tins, \$6 75@\$7, and ternes, \$5.75@\$6.

MESSRS. ROBT. CROOKS & Co., of Liverpool, under date of August 3, say that: "Tin Plates, during the past month, very materially advanced, the increased value of Coke tins being 1/3 per box, and of other descriptions 9d. to 1/. This has for a time checked purchases, and it remains to be seen whether against this makers can hold up the market, or whether buyers will have to operate further at present rates. At date the latter contingency appears the more probable. The make is certain to be at least confined to its present limits until the end of September, and impending failures make a further curtailment likely."

Lead.—The only business done has been in a small way. There are no important features in the market for this article. We quote ordinary at 7c., currency, nominal.

Spelter and Zinc.—Domestic spelter is quoted at 7¼c.@7¼c., currency, with but very little changing hands. Although the Combination is practically broken, yet the small production fairly maintains prices. Sheet Zinc is unchanged, at 8⅛c.@8¾c., gold.

Antimony, under a limited business, is quoted at 15¼c.@15¾c., gold.

Quicksilver.—The London price remains unchanged, at £9, while San Francisco quotes at 45c.@46c.

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Aug. 18, 1876.

THE coal stocks still continue downward, the whole list showing a decline, the total transactions exhibit a falling off of over 28,000 shares.

New Jersey Central Railroad.—This stock is rather steadier, 3 per cent. will represent the range between the extreme prices; the transactions are less by one half as compared with the sales given in our last. The final quotation is 1⅛ per cent. lower.

An engineer employed by the bondholders recently made an examination of the line from Summit, N. J., to Newark. Nearly all of this portion of the line was graded, and the bridges and trestles built some four years ago. His report is, that to put the line in good order, complete it, and lay the track, will require about \$300,000. The distance is about 12 miles.

It is also reported that the Delaware, Lackawanna & Western Company desires to secure possession of the road, chiefly in order to use a part of the graded line east of Summit to straighten and improve its own line.

In regard to the reduction of the wages of the employees of this road, it transpires that the engineers continue work at the old rates.

Delaware, Lackawanna & Western Railroad.—25,821 shares of this stock have changed hands during the week at from 92⅛ to 95⅞, closing at the lower figure. We note some sales at seller, 60 days, options, 1¼ below the lowest price, and a further fall would seem to be imminent.

Much of the work made necessary by the change of gauge having been finished, the force in the car and machine shops of this company is being reduced. A number of men were discharged last week, and others will probably follow. Wages in the car shops have also been reduced.

There is great dissatisfaction among the mine engineers, firemen and pump-runners of the company on account of the reduction of wages, and a large delegation of the employees waited on Mr. STORRS, the general agent, on the 15th inst. He informed them that the company was compelled to make the reduction regardless of consequences, but when trade and prospects brightened they would be restored to their former wages.

The *Scranton Republican* of the 16th inst. says: "We learn that preparations are in progress for the removal to this city of all the D. L. & W. railroad shops along the line, including those at Kingston on the L. & B. branch at Great Bend and elsewhere. This will materially facilitate the work of the company, as well as confer a great benefit on Scranton, as it will necessitate keeping constantly employed here a larger force of workmen than at present. The transfer will take place as speedily as possible, and to that end several changes have been planned in connection with the Scranton shops, and will speedily be put into execution. The recent rush of work incident to reducing an enormous quantity of coal cars to the requisite gauge has demonstrated that under the present efficient management the most pressing emergency can be met, and this doubtless in some measure hastened the company to the conclusion that it would be a wise measure to concentrate all their works in Scranton."

Delaware and Hudson Canal Company.—This stock has sold down to 89 on regular transactions, and 2½ per cent. below this figure on sellers options of 60 days. The total transactions reach the unusual amount of over 5,000 shares, with a margin of 6¼ per cent. between the extreme prices. The final price of 91⅛ is 3 per cent. lower than quoted a week ago.

Mariposa Land and Mining Company.—100 shares of this stock has changed hands at \$8 per share. Recent telegraphic advices from the mine says: The tunnel is now in 1,815 feet. Foundations and framework are building to receive an air compressor, to be used to drive the tunneling machinery. A new quartz mill has arrived on the ground, and two sawmills are now employed working up lumber for the necessary buildings. New amalgamating machinery, to extract fine gold and sulphurets from ores, has been built, and will be placed in the sixty-stamp mill on the Merced River. This mill has been reconstructed with a view to permanent operations in the Fall. Several new buildings, suitable for dwellings, lodging-houses for miners, blacksmith shops, storehouses, and stables, have been erected near the mouth of the tunnel, involving an outlay of something over \$30,000 gold. There are indications of some of the inner, managerial workings of this company that are not such as to inspire confidence, but we await developments.

Iron Mountain, Chester, and Eastern Railroad.—This railroad is the middle link of a road that in the future is to tie together the block coal fields of Indiana and the immense iron deposits of Missouri. That portion already in operation passes over the great coal fields of Southern Illinois, and the Western Division, in Missouri, is two-thirds of its length graded, and will now soon be completed to the famous Iron Mountain, and thus uniting the iron mines of Missouri, with the extensive coal fields of Illinois and Indiana.

Quotations and Sales of Stocks and Bonds,

For the week ending Aug. 18, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	238	—
Consolidation Coal Co	—	—	40	700
Spring Mt. Coal Co	—	—	*55	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	12	100
Del., Lack., and West. RR. Co.	95⅞	92⅛	92¾	25,821
New Jersey Central RR. Co.	63¼	59⅞	59⅞	13,034
Delaware and Hudson Canal Co.	95¼	89	91½	5,371
Quicksilver Mining Co. pref'd	—	—	14	—
" " Common	—	—	12	—
Mariposa Land & Min. Co. pref'd	—	—	8	100
St. Louis & Iron Mountain RR.	18⅛	16	17½	320
Lehigh & Wilkes-Barre Coal Co.	—	—	—	—
Total Shares sold				45,446
Sales for the week previous				73,879
Decrease				28,433

* Nominal.

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M.	M. & S.	.....	.... @109½
" " " 7's Con'ble	J. & D.	...	.... @ ....
Cent'l RR. of N.J., 1st M, New	F. & A.	....	.... @116
" " " 1st Cons.	.....	39,000	97⅛@101½
" " " Convert'le	M. & N.	5,000	93½@ 94
Lehigh & W.-B'e, Con. Guar'd.	.....	39,000	85½@ 87
Am. Dock & Imp. Mt. Bonds..	J. & J.	4,000	92 @ 94
Del. & Hud. Can., 1st M., 1891	.....	.... ..	... @111
" " " 1884	...	.....	.... @ ....
" " " 1877	.....	1,000	@103¾
" " " Coup. 7's, 1894	.....	.....	.... @109
" " " Reg'd 7's, 1894	.....	.....	.... @ ....
St. L. & Iron Mountain, 1st M	F. & A	.....	.... @ 101
" " " 2d M	M. & N	.....	.... @*79
Chesapeake & Ohio 6's, 1st M..	.....	.....	... @*27½
" " Ex. Coupon	.... ..	.....	... @ ...
Mariposa Gold Loan con. 7s....	.....	.....	... @100⅝
Total sales..		\$88,000	

* Nominal.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, August 17, 1876.

WE note a slightly weaker feeling in the quotations of the stocks dealt in on this market during the past week. The transactions show a falling off of nearly 12,000 shares, the quotations at the close being, with one exception, the same as recorded in our last.

Pennsylvania Railroad.—The sales in this stock amount to some 38,000 shares, within the range of 49@49¾, closing at 49⅝.

The connection between the tracks of the Belvidere Division and the Delaware, Lackawanna, and Western road at Manunka Chunk, N. J., has been completed. Now that the gauge of the latter road has been altered to the standard (4 feet 9 inches), this connection is necessary to permit the exchange of cars. Cars from the Delaware, Lackawanna, and Western road can now be sent to Philadelphia by this route.

Lehigh Valley Railroad.—1654 shares comprise the weeks transactions in this stock, and 55¼@56¼ the range in prices. The quotations closing at the highest price. The arrangement between the Lehigh Valley Railroad and the Erie Railway Company, for the laying

of the third rail from Waverly to Buffalo, 170 miles, is said to be as follows: The first 20 miles of the third rail, from Waverly to Elmira, were laid some time since under an arrangement between the two roads, by which the Lehigh Valley furnished the rails and took its pay by a certain percentage of its monthly dues to Erie for freight over said rail, for the payment of which the Erie gave the Lehigh Valley security with interest. The balance of the distance of 150 miles, which has lately been completed from Elmira to Buffalo, was railed by the Lehigh Valley under a similar arrangement with the Erie, costing about $1,000,000. The indebtedness of the latter to the former for the first 20 miles of rail has already been discharged, and that for the last 150 miles is being discharged by the withholding of the same monthly percentage of earnings. To discharge this last debt of $1,000,000 it is estimated two years will be required, beyond which time there is an arrangement by which the Lehigh Valley has certain special privileges from the Erie not accorded to other roads, but it has no concessions in perpetuity, as has been supposed was demanded of Erie before the funds were furnished to lay its third rail. After that time has elapsed, the Lehigh Valley is on the same footing as other roads.

Reading Railroad stock has sold to the extent of nearly 9,000 shares, the range in the prices are not of sufficient importance to call for special comment, the closing quotation is the same as in our last.

Lehigh Coal and Navigation Company.—This stock is weaker, the sales for the week amount to 7,595 shares, some sales having been made as low as 38, the closing price indicates a recovery of one point from this, yet still ¾ below the final price in our issue of the 12th inst.

Delaware Division Canal Company.—This company has declared a dividend of 4 per cent., payable on demand. We note an auction sale of 75 shares of the stock of this company during the week, at from 49½ to 50 per share.

Delaware and Raritan Canal Company.—10 shares of the stock of this company sold at auction during the week at 138½ per share.

Bonds.—The dealings and quotations in these do not show much variation, as compared with our last.

Quotations and Sales of Stocks and Bonds,

For the week ending Aug. 17, 1876.

STOCKS.

	Highest	Lowest	Closing	Shrs
Lehigh Valley RR. Co	56½	55½	56½	1,654
Pennsylvania RR.	49¾	49	49½	38,121
Reading RR.	44¼	44	44⅛	8,957
Lehigh Coal and Nav. Co	39¾	38	39	7,595
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co.	—	—	*25	—
Fulton Coal Co.	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	85	—
St. Nicholas Coal Co.	—	—	*1	—
Cambria Iron Co.	—	—	16	30
Crane Iron Co.	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	71½	12
Total shares sold				56,369
Sales for the week previous				67,905
Decrease				11,536

* These quotations are nominal.

BONDS.

	Sales.	Price
H and B. T. RR. 1st mortgage, 7s	500	@107
" " " 2d " "	—	@102
" " " 3d " cons	—	@ 43
Lehigh Valley RR. Con. mtg. 6s	23,000	@100
" " " 7s, 1910	2,000	@114
" " " 6s Reg.	1,000	@109
" " " C. M. 6s 1923	—	@ 99¾
Pennsylvania RR., 1st mtge. 6s	3,000	@105¾
" " gen. " cou. 1910	8,000	@106
" " gen. " 6s, reg.	1,000	@106¾
" " Cons. M. 6s reg.	—	@ 99½
Phil. & Reading RR. 7s '93	—	@109
" " G. M. 7s, reg.	—	@106
" " " " 7s coll.	—	@106
" " new convertible 7s	1,900	99 @100
" " 6s 43-80	—	@101
" " debenture 6s	32,00	@ 77
Phil. & Reading C. & I. Co. Deb. 7s	—	@—
" " Locust Mount. tract	—	@ 80
Lehigh Coal & Nav. Co., 6s '84	100	@102¾
" " " RR. 6s, '97	10,100	@101
" " " 6s, '77	1,000	@ 97
" " " 6s gold loan	6,000	102½@103¾
Penn. Canal, 6s	—	@ 72½
Penn. and N. Y. Canal, 7s	3,0 0	@109⅜
Ches. and Del. Canal, 6s	—	@ 86
Susquehanna Canal, 6s	4,000	@ 75
Delaware Division Canal, 6s	—	@—
Susquehanna Coal Co. 6s	—	@ 77
Buck. Mount Coal Co. 6s	—	@—
Penn. Gas Coal Co. 6s	—	@—
Honeybrook Coal Co. 7s	—	@—
Total amount of sales	$67,800	

Closing quotations, in the absence of sales, represent the atest prices bid.

Gold and Silver Stocks,

NEW YORK, FRIDAY EVENING, Aug. 18, 1876.

Our quotations of the San Francisco Mining Share Market of to-day do not exhibit any very noteworthy changes compared with our last. The market is irregular with the bulk of quotations inclined upwards, and in no instance do we observe a difference of over $5 per share in the quotations. We are indebted to the *Gold Hill* (Nevada) *News* of the 10th inst. for much of the information given below respecting the condition of the workings in a number of the Comstock mines.

Consolidated Virginia.—The bullion receipts of this mine for the month of July amounted to $336,000. The main shaft has been completed to the 1,500-feet level sufficient to admit of supplying the timber for the use of both the Consolidated and California mines on the lower levels. It will not take long now to put everything in excellent condition for the steady extraction of ore from that point. The ore stopes on both the 1,400, 1,500 and 1,550 feet levels are looking finely. The ore body south on the 1,400-fee t level is proving much richer than has been expected, and now ore of a rich quality is also being opened northward on the same level. The mine down to the 1,550-feet level never was as well ventilated and in as good condition for the rapid extraction of ore as now. The west crosscut from the north drift, on the 1,700-feet level has been extended as far as it was safe to run it until the water in the bottom of the winze, below the 1,550-feet level, is drained. In order to accomplish this without danger to the workmen, the drift has been stopped and a diamond drill started to bore through to the bottom of the winze and tap the water.

The Julia Gold and Silver Mining Company (Annual Report).—We take the following from the San Francisco *Stock Report* of the 11th inst.: The principal expenditures of the past year were, on account of the mine, $184,836.47, and $21,538.60 for hoisting works, compressor and drills. The receipts were from sales of working and capital stock, $152,720.30. Cash on hand, August, 1875, $18,693.54. The present indebtedness is $37,101. During the past year the shaft was sunk 450 feet, making its present depth 1,800 feet. The 1,000 level drift was advanced 110 feet, and two prospecting drifts were run from this drift, one south 80 feet, and the other west 272 feet. Considerable vein matter was encountered in these workings. Another station was opened and a drift west started at a depth of 1,400 feet, which was advanced 1,050 feet. When in a distance of 638 feet it encountered vein matter of a very promising character composed of a mixture of clay, decomposed quartz and porphyry. Another drift was run along the east wall of the ledge, a distance of 122 feet, developing considerable low grade ore, not worth extraction. At the 1,500-level, a station was opened, pump, bob and tank put in, and the drift run 159 feet, all in very hard rock. From the 1,600-level a drift was run a distance south-west 829 feet and another south 461 feet, the latter carrying very favorable promises promises of developing an ore body. From the 1,800 level station a drift south is in 310 feet, the last 250 feet being carried along the east wall of the vein; the vein has well defined east and west walls, and its characteristics are identical with the vein on the 1,600. In cutting out ground for a station at the 1,700 level at a distance of four, but on the east side of the shaft they cut a vein of quartz of fine quality, and which, on advancing, was found to be ten to twelve feet in width. This vein appears to be well defined, and has an inclination to the east. In consideration of this discovery, at the 1,800-foot level a drift north has been started and is in 70 feet." The Superintendent, in summing up, says that during the past year the shaft was sunk 450 feet; 3,561 feet of drifts run, besides putting in the necessary pumps, bobs and tanks. The machinery and all appurtenances are first-class and capable of sinking to a much greater depth.

The latest information from the mine states that the main south drift on the 1,600-foot level is steadily advancing, the face still in quartz of a fine character, portions of which give excellent assays. On the 1,800-foot level the face of the main south drift is in very favorable ground, with excellent indications of soon finding pay ore. The face of the east drift on the 1,800-foot level has cut through a streak of clay, and is just entering what appears to be a fine body of quartz, with every appearance of pay ore. This is no doubt a continuation of the ore vein struck east of the shaft on the 1,700 foot level.

California.—The daily yield of this mine equals 700 tons of ore; which keeps the mills steadily running. The yield of bullion for the month of July was $2,062,400, and will be not far from the same amount for August. The ore stopes wherever they have been opened on the 1,500 and 1,600-feet levels, are showing just as richly as ever. Beyond this there are no changes to report of the mine. The pumping machinery of the C. & C. shaft is working splendidly, and sinking the shaft has been resumed. The new stamp mill is about completed, and will soon be ready for operations when the company will commence crushing ore. This mill will add a crushing capacity of 300 tons to that already now in use, which will increase the amount of ore extracted and crushed to about 1,000 tons per day, and the yield to nearly or quite $3,000,000 per month.

The California Mill commenced crushing ore from the mine in April, and the monthly bullion receipts from the same during the interval have been as follows:

Month ending May 7	$1,609,500
Month ending June 7	1,478,000
Month ending July 4	1,402,000
Month ending August 5	2,062,400
Total four months	$6,551,900

Four dividends of $4,320,000 have already been paid, A surplus amounting to $2,231,900 should be left in the Treasury after paying the August dividend. The August product will probably be larger than for the month just closed.

It is rumored that the tailings from the mills of this mine, and that of the Consolidated Virginia have been sold for the sum of $4,000,000. If this has been done it will cause great loss to all engaged in the concentration of sulphurets in Six-mile Canyon, and will nearly ruin some of them whose all is invested in the business.

Sutro Tunnel.—This work was in 13,839 feet on the 1st inst., the number of feet driven for the week amounted to 100 feet. Quantity of water, 174 miners' inches. Temperature, at mouth, 77 degrees; at Shaft No. 1. 79 degrees; at Shaft No. 2, 80 degrees; at Header, 83 degrees. Temperature of air, at Mouth, 78 degrees; at Shaft No. 1, E., 81 degrees; W., 79; at Shaft No. 2, E., 82½ degrees; W., 83; at Header, 85 degrees. Rock limestone mixed with clay. Soft, requiring close timbering. Holes drilled, 325; holes blasted, 411; aggregate depth, 2,074 feet; average depth, 6·38 feet; powder consumed, 838 lb.; exploders consumed, 411; drills sharpened, 651; rock extracted, car-loads, two tons each, 739.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	Aug 11.	Aug. 18.
Sierra Nevada	3,300	100,000	$15	$14
Union Consol'd.	600	100,000	14	—*
Mexican.	600	108,000	33	34
Ophir	675	108,000	5	5 1/16
California	600	540.000	61	60
Consol'd. Virginia	710	540,000	54	53
Best & Belcher	540	100,800	48	49
Gould & Curry	612	100,800	16	14
Savage	771	112,000	20	19
Hale & Norcross.	400	112,000	10	11
Chollar Potosi	1,400	28,000	91	93
Alpha Consol'd.	306	30,000	43	48
Imperial Con.	468	503,000	6	5
Yellow Jacket	957	123,000	30	31
Kentuck	95	30,000	12	—*
Crown Point	541	100,000	12	12
Belcher	1,040	104,000	20	23
Overman	1,200	38,400	77	74
Caledonia	2,188	100.000	10	9
Justice	2,100	105,000	—*	23
Raymond & Ely	5,000	30,000	9	—*
Meadow Valley	4,400	60,000	50c.	—*
Eureka Consolid.	....	50,000	12	—*
Eureka G. V.	1,680	20,000	3	—*
Silver Hill	5,400	54,000	9	—*
Julia	3,000	110,000	8	—*

* We have no quotations of these stocks for the dates given above.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, Aug. 17, 1876.

The market remains in the same dull condition, and we have little change to note. Calumet after dropping to 159¼, has rallied to 160½. The annual meeting was held yesterday, and the following Board of Directors elected: ALEX. AGASSIZ, President, QUINCY A. SHAW, GEO. HIGGINSON, H. H. HUNNEWELL, JAS. M. WRIGHT. They show a net surplus of about $2,600,000. Copper Falls is in some demand at $3. The mine is looking better, but as yet no copper, although they are likely to strike it at any moment. National is strong at 1¼, with little, if any stock offering. Duncan after settling back to 3½, advanced to 3⅝, and is again off to 3⅝, closing 3½ bid. There is some demand for International Silver at from .35 to .40. This mine is next to the Duncan, and is supposed to have the same vein running through it. The Duncan is working with success. The International Silver is not working at present, but is waiting for the result of Duncan. The stamp mill at the Duncan will be in order for running by Sep 1. Quincy is stronger at 4¼ bid, after selling as low as 40. Small Coppers nothing doing.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20 000	$ —	$ 7 00
Calumet and Hecla	25	80,000	160 37½	160 62½
Central	25	20,000	30 00	31 00
Copper Falls	50	20,000	3 00	3 25
Dana	25	20,000	10	12½
Franklin	25	20,000	10 50	11 50
Humboldt	25	20.000	10	12½
Madisca	25	20,000	27	30
Mesnard	25	20,000	37½	50
Minnesota	25	20,000	1 25	1 75
National	15	20,000	1 25	1 50
Osceola	25	40,000	21 00	22 00
Petherick	25	20,000	—	50
Pewabic	25	20,000	2 75	
Phenix	25	20,000	12 25	12 75
Quincy*	25	20,000	41 50	41 75
Ridge	25	20,000		
Rockland	25	20,000	25	30
International Silver	20	60,000	35	50
Star	25	20,000	40	55
Superior	25	20,000	10	12½
Duncan Silver	20	60,000	3 50	3 75

Gas Stocks,

NEW YORK, FRIDAY EVENING, August 18, 1876.

THE market for gas stocks is at a stand still, no sales being reported, and no changes have occurred in the quotations since our last.

Boston Gas Co.—Transactions in this stock are reported to us at $797½. per share.

Malden and Melrose Gas Co.—We note a sale of three shares of this stock at $85¼ per share.

The Consumers Gas Co., of Chicago, Ill., is the name

of a new company recently organized, to commence operations in that city. It is understood that the company will manufacture a water gas. They are restricted to charging both private consumers and the city $1.50 per 1,000 feet.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Divid.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.....	$5,000,000	$ 100	2½	Jan. '76	110	111
" " Bonds	90,000	1,000	†3½	Feb. '76	105	
New York, "	4,000,000		5	Jan. '76	135	140
Metropol. "	2,500,000	100	5	Mar. '76	150	155
" " Certf.	1,000,000	....	3½	" "	101	102
" " Bonds	500,000	1,000	3½	Jan. "	102	102½
Harlem "	1.850,000	50	4	Feb. '76	115	116
Manhattan " .	4,000,000	50	10	July "	240	—
Brooklyn, B'klyn..	2,000,000	25	5	June '76	180	190
Nassau " ..	1,000,000	25	4	Jan. '76	75	75¾
" " Certf.	700,000	1,000	3½	Nov. '76	94	95
People's "	1,000,c00	10	3½	Jan. '76	45	50
" " Certf.	300,000	1,000	3½	Jan. '76	80	85
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3½	Nov. '75	70	75
Wmsburgh " ...	1,000,000	50	5	Jan. '76	125	130
" " Certf.	1,000,000	....	3½	Jan. "	100	102
Citizen's "	1,200,020	20	2½	Jan. '76	88	90
" " Certf.	320,000	1,000	3½	April "	99	101
J. C. N.J.....	386,000	20	5	July,'75	160	—
Centl. Westch. N.Y.	465,000	50	4	July, "	95	100
Subur'n " "	390,000	50				95

† Gold.

Companies out of Town.—No changes have occurred in the quotations of the out of town companies; we refer to our issue of the 29th ult., which contains the list of these.

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Its subscribers comprise nearly all the proprietors, managers, and agents of collieries and ironworks in the United Kingdom, and include also a very large proportion of the upper class of officials entrusted with the management of the various departments of coal mining and iron making. It also circulates largely amongst gentlemen engaged in scientific pursuits and in the various branches of manufacture and commerce.

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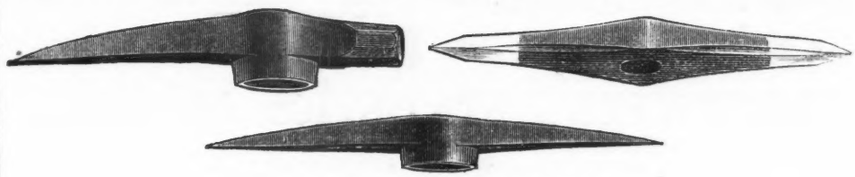

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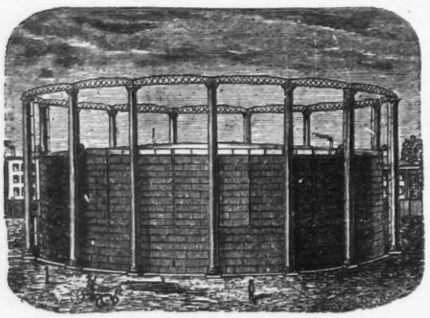

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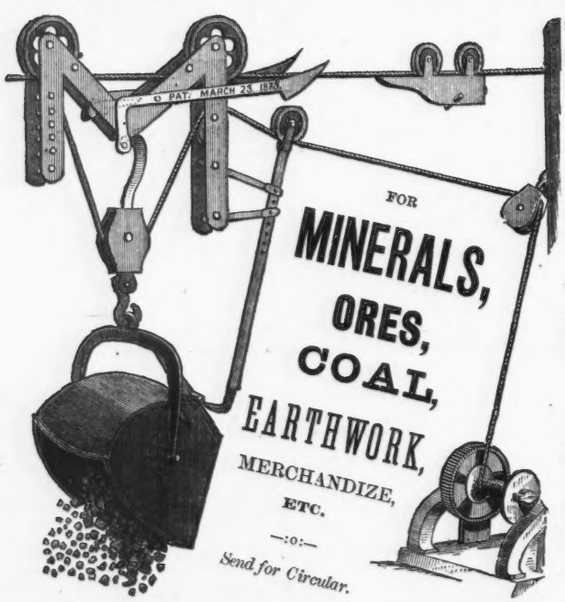

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